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Nkwana, Kenneth

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Negotiating sustainable off-take agreements between Eskom and alternate electricity suppliers in South Africa

Kenneth Nkwana

A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

Johannesburg, 2016

ABSTRACT

Eskom, a state owned power utility, is both vertically integrated (generating, transmitting and distributing electricity) and a monopoly supplying 95% of electricity in South Africa. In recent years, Eskom has not been able to meet the demand for electricity, resulting in power outages known as load-shedding.

Whilst Eskom builds new power stations, the government has encouraged electricity supply from independent alternate suppliers of electricity, also known as independent power producers (IPPs). Many IPPs have embraced the opportunity and have off-take (power purchase) agreements with Eskom however, not all have succeeded.

This qualitative research focuses mainly on renewable sources of electricity, especially wind energy, solar (concentrated solar and photovoltaic) technologies.

The research scrutinises the power generation model in South Africa and studies key factors, risks, constraints, issues and opportunities in the process of negotiating sustainable off-take agreements between Eskom and IPPs. The report then recommends the best approach to long-term sustainability of electricity supply in the country, including migration of base load electricity provision from coal and other fossil fuels to more sustainable wind and solar technologies. Also recommended are areas for further exploration, not covered by this research in detail, include the best model of electricity supply in South Africa; whether Eskom should remain the system owner and the feasibility of the energy internet in South Africa.

DECLARATION

I, Kenneth Nkwana, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Kenneth Nkwana

Signed at Johannesburg

On the 20 day of June 2016

DEDICATION

This work is dedicated to my wife (Refilwe), and our 9 year old daughter, Mohau. And, yes Mohau, you own Papa's weekends again…

ACKNOWLEDGEMENTS

A big thank you to my poor wife, and daughter, Refilwe and Mohau Nkwana, who have had to bear with less than a husband and father for two years. Ma, your prayers and support were vital, ngiyabonga!

Dr Geoff Heald my supervisor what an honour, thank you! Prof Anthony Stacey, your passion for research rubbed off, thank you. Bootcamp II Crew, you inspired!

A special thank you to all my contributors (most within my organisation) who agreed to participate without hesitation some even offering material.

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Melusi Mthembu, I have finally hit that bell, done!

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ABBREVIATIONS

CSP	Concentrated Solar Power
DoE	Department of Energy
DPE	Department of Public Enterprises
GWh	Gigawatt hours
GW	Gigawatt
IPP	Independent Power Producer
ISMO	Independent System and Market Operator
LCE	Levelised cost of electricity
LOPP	Life of Plant Plan
MTPPA	Medium Term Power Purchase Agreement
MW	Megawatt
MYPD	Multi Year Price Determination
NDP	National Development Plan
NERSA	National Energy Regulator of South Africa
OCGT	Open Cycle Gas Turbines
PPA	Power Purchase Agreement
PV	Photovoltaic
RE	Renewable Energy
REIPPP	Renewable Energy Independent Power Producer Procurement

	Programme
REPS	Renewable energy portfolio standard
SA	South Africa
SOC	State Owned Company
SOE	State Owned Enterprise
STPPA	Short Term Power Purchase Agreement

CHAPTER 1. INTRODUCTION

1.1 Purpose of the study

The research determines the appropriate conditions suitable for negotiating sustainable off-take agreements between Eskom and alternate electricity suppliers. It explores requirements by Eskom and then develops an understanding of the constraints and issues of alternate suppliers. The search finds answers to the strategic survival of Eskom and how negotiating sustainable off-take agreements enhances the business case for the sustainability of the Eskom into the future, given the increasing requirement for renewable production of energy.

1.2 Context of the study

Eskom, is a South African Power utility, and is one of several state owned companies. It has also been mandated to supply electricity to the country and some neighbouring countries (Eskom, 2014). The purpose of this study is to provide sustainable electricity solutions to grow the economy and improve the quality of life of the people in South Africa and in the region.

Eskom has a generating capacity of 42 Gigawatts, which supplies about 95 percent of electricity in South Africa. Municipalities consume 42 percent of this electricity whilst industries, mining and residential customers consume 25 percent, 14 percent and 5.1 percent respectively (Eskom, 2014).

As shown in figure 1 below, over 85 percent of the current energy produced is generated from coal combustion. A further 5.7 percent of electricity is generated from gas, through Open Cycle Gas Turbines (OCGTs), (Eskom, 2014). The gas and hydro turbines form what is known as peaking energy, only brought on-line to produce energy when nuclear and coal generated base load energy is insufficient to meet the demand for electricity.

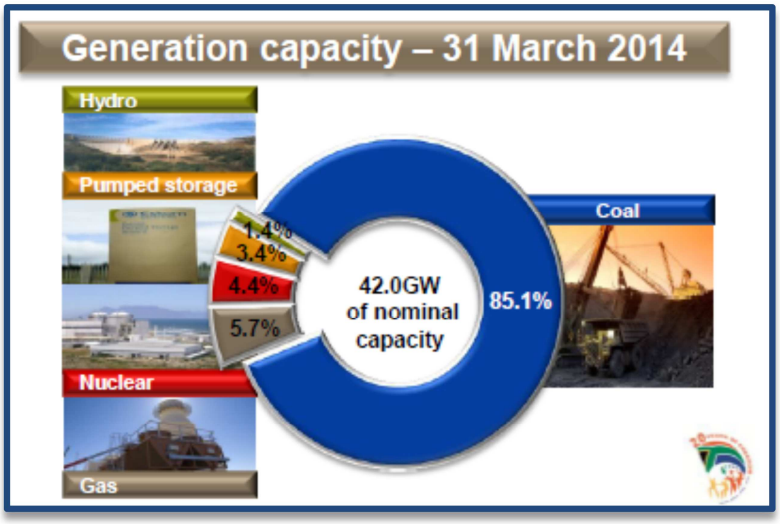


Figure 1: Eskom generation capacity and energy mix (Eskom, 2014)

Only 4.8 percent of all energy produced by Eskom is accounted for by renewable sources. These are counted as peaking energy units only operated to meet the excess demand of electricity (Eskom, 2014). The energy mix produced by Eskom still lacks renewable sources such as wind, solar, wave energy. Whilst Eskom might intend to increase capacity from renewable forms, it is advisable that alternate suppliers also be allowed to contribute towards the alleviation of the shortage of electrical energy supply as well as the weakened financial position Eskom finds itself right now (Eskom, 2014).

As reflected in the Eskom annual report (2014), the 91 year old company employed 46 919 employees. The Group revenue for 2013/14 financial year is R139 billion with a net profit of R7 billion. There was however, a projected R225 billion for the capacity expansion programme that would alleviate South Africa from electricity supply constraints that continue to subject the country to Eskom's emergency supply protocols popularly known as black-outs or load shedding (Eskom, 2014).

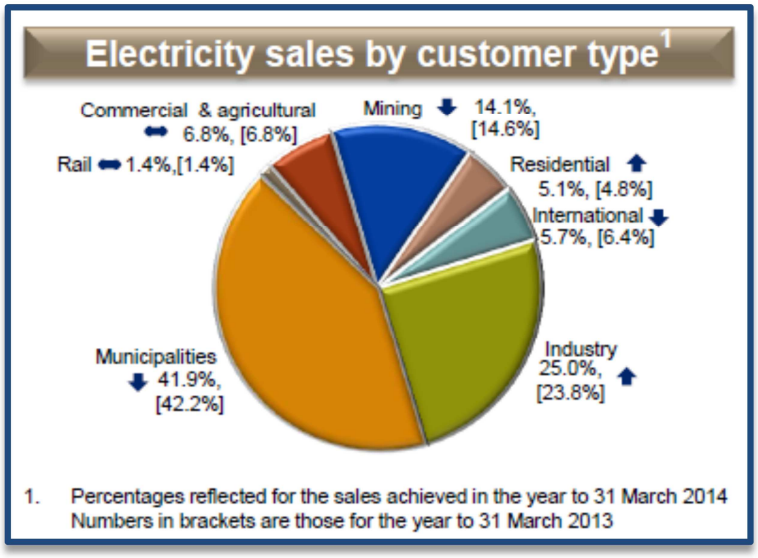


Figure 2: Eskom sales by customer type (Eskom 2014)

Countries with policies that support renewable energy have increased to over 130 from a recent 50 countries (Frost & Sullivan 2015). Apart from a European Union target of sourcing 20 percent energy from renewable sources by 2020, Frost and Sullivan (2015) state that some countries have, in fact, set themselves consumption of renewable energy targets from between 10 percent to nearly 50 percent. A study by Frost and Sullivan (2015) assert that forecasts that globally, the installed renewable capacity will more than double from 2012's 1.6 GW to 3,2 GW in 2025. According to the same study, the costs of renewable energy have significantly dropped, due to economies of scale and technological innovation.

The national energy regulator's (NERSA's) efforts in developing the regulatory framework and electricity reselling tariffs has spurred on South Africa's Independent Power Producers (IPPs) to seek opportunities of contributing in relieving the country's power crisis (Lilley, 2015). Lilley (2015) states that the IPPs seek to do so by adding power generation to the national grid using technologies that could be built in a period of 18 months. In the same article, the chairperson of the South African power producers' association (SAIPA), declares that 800 MW can be produced through cogeneration and 6600 MW through other technologies.

Alternate energy suppliers have to be considered, given the power system constraint, vulnerable supply of electricity and load shedding caused by underserviced power plants and delayed construction of new power stations, for the next three years (Creamer media reporter, 2015). In the long term, and given the long term sustainability of the utility and the global trend (Frost & Sullivan 2015) of harnessing energy from renewable sources, it is critical that the organisation not only generates electricity but also involves alternate suppliers or IPPs, given the difficulty in constructing power stations on time and the keenness demonstrated by the IPPs to invest.

In the case of the IPPs, it is essential for their sustainability that they do not just bring technologies but for sustainability, it is essential that their business strategies are aligned with their technologies, that the same technologies shape their future modelling and strategies and that there is full convergence between their business and their technological undertakings (Hoque, Walsh, Mirakaj & Bruckner, 2011). Misalignment between the business operations, strategy and technologies will not be sustainable and result in an unsustainable IPP that constructs power generation facilities but cannot sustain the momentum in the long term.

In negotiating long term and sustainable off-take agreements between Eskom and IPPs, the negotiating teams need to focus on reconciling interests. Fisher and Ury (1986) argue that focusing on interests rather than positions in negotiations is beneficial for two reasons. Interests can be satisfied by several positions and in opposed positions there could be many more shared compatible interests. In other words, the parties should focus on each side's needs, desires, concerns and fears in order to arrive at agreeable solutions.

1.3 Problem statement

1.3.1 *The Main Problem*

The determination of what would be the best conditions for negotiating an off-take agreement between Eskom and any alternate power supplier. Such conditions need to assist the parties to agree to and sign a sustainable off-take contract. Understanding the alternate electricity supplier's needs and constraints against the requirements they need to comply with in order to supply energy onto the Eskom grid. Further, the study needs to understand the current regulatory environment and assess what it needs to be in order to be conducive and to support a sustainable Eskom and private sector alignment and contracting for alternate energy supply.

In determining the best conditions for negotiating off-take agreements between the parties, it is essential it is essential to fully explore the extent to which such suppliers are required, the scope of Eskom's mandate.

1.3.2 *Sub-problem*

1.3.2.1 The sub-problem is to determine the need for sustainable off-take agreements with alternate electricity suppliers and then venture further to understand Eskom's mandate and factors that influence the sustainability of agreements between Eskom and IPPs.

1.3.2.2 Secondly, this research studies the current state utility supply model, its effect on sustainable agreements with IPPS. Further, the research assesses the sustainability of the model.

1.4 Significance of the study

The study sought to provide guidance to the negotiating and conclusion of sustainable off-take agreements that would enable alternative sources of supply

of electricity in the country that would give rise to the harnessing of renewable sources of energy. The success of off-take agreements between Eskom and alternate suppliers could very well result in the long term sustainability of electricity supply in the country with respect to the base load moving from coal and fossil fuels to more sustainable forms like wind and solar. It may also change the trajectory of the electricity supply monopoly, allowing many more players, giving rise to new industries that create and increase employment in the sector.

1.5 Limitations of the study

The focus of the study is alternate suppliers of electricity in South Africa that use renewable forms of energy for connection onto the Eskom electricity transmission and/or distribution grid. The study excluded the following:

- Electricity generated from nuclear energy and other non-renewable sources of electrical power generation technologies like fossil fuelled power stations
- Transmission and distribution of electricity. The study did not dwell on the details of transmission and distribution aspects of the electricity industry.
- Municipalities and their electricity distribution grids
- Technical requirements of connecting to the Eskom network. These technical specifications are listed and defined in what is known as the Grid Code.

1.6 Definition of terms

Base load energy – Electrical energy supplied on a continuous basis by Eskom

Grid – The South African electricity network transmitting or distributing electricity

Grid Code – Technical specifications required for compliance in order for any producer of electricity to be permitted to transmit electricity on the electricity network.

Independent Power Producer (IPP) – Any entity or company independent of the government that intends to generates electrical power (Department of Energy, 2011)

Off-take Agreement – A contract wherein a generator/producer/developer of goods delivers part or total of the goods for sale to a buyer who receives in exchange for money

Power Purchase Agreement (PPA) - a contract between generator and a buyer of electricity governing the buying and selling of electricity between the parties

Renewable Energy (RE) – a natural energy source or energy derived from a natural source that is inexhaustible. Examples include wind and solar, etc.

Peaking Energy – Electrical energy generated by Eskom to supplement shortage of supply to meet demand

Watt (W) – measure of (electrical) energy consumption or production in joules per second otherwise known as power. A thousand of these is known as kilowatts (kW) and a million as megawatts (MW), whilst a thousand MW is equal to gigawatts (GW). A gigawatt hour (GWh) is a measure of an energy units produced.

Wheeling Agreement - a contract between a generator of electricity and a system owner (typically Eskom), for the use Eskom's network to deliver electricity to a consumer or customers (Eskom, 2012).

1.7 Assumptions

It was assumed that:

- There were several potential alternate energy suppliers local and/or multinational willing to invest in electricity production in South Africa with the know-how of implementing viable and reliable forms of technologies
- There was a sufficient pool of experts within and outside Eskom and in South Africa to provide the required insight into the study
- The respondents would provide sufficient information to inform the conclusions and recommendations regarding the research and its findings

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

This chapter defines in some depth the off-take concept and project finance, as well as its relationship with managing financial risks of infrastructure projects and renewable utility power generation projects. It also reviews the current climate and contract conditions between Eskom and its suppliers and alternate power suppliers, known as independent power producers (IPPs).

The need for renewable energy IPPs and sustainable off-take agreements is studied in this chapter. The relationships between key stakeholders and their roles in the determination of off-take prices and other conditions are also a subject of discussion.

Thirdly, the study addresses the vertical integration of Eskom and its sustainability in the face of industry and energy transformation globally.

2.2 Background discussion

At the heart of the research proposal is the concept of an off-take agreement. Off take, also referred to as off-take, is an output of some inputs in a process and thus a reference to off-take product (Shaikh, Stein, Cullwell, & Tendler, 2014). An owner of the finished product contracts with an off-taker for the supply of the product. The agreement will typically be to utilise the product provided by the owner or supplier with certain terms and conditions. It is logical then that the ensuing contract is known as an off-take agreement (Shaikh et al., 2014). This concept derives from the risk management of ensuring continued revenue in a funded project for supply of the off-take (Shaikh et al., 2014).

Power utility projects require abundant financial capital (Miranda, 2006). If the organisation seeking to invest does not have the funding, and they usually do not, funding can be sourced from lenders that either lend through the balance sheet or project financing (Miranda, 2006). Miranda (2006) asserts that balance

sheet funding depends on the creditworthiness of the organisation, the assets versus liabilities valuation and critically, the ability to honour financial obligations of the loan.

Project finance on the other hand is a risk discovering process that assesses the financial circumstances but approval is based on the projected income that will be generated by the project (Miranda, 2006). This condition, she suggests, is applicable whether there is some or no contribution from project sponsors or holders of equity in the company. The extent of the risks to the successful funding and sustenance of energy utilities includes market, political, commercial (Including contracts), project execution, legal, technology, competitors, infrastructure and operating risks. The effect varies from country to initiative. Each is affected uniquely by these factors (Miranda, 20006).

Market risk bears the highest risk determinant influence in project funding determination (Miranda, 2006). Without a market for the off-take, it appears there is no reason for provision of the product and no one would fund a project that has risk of not generating revenue.

Political risks are also of key interest and they refer to the interests, political stability and regulatory environment in a country where the utility will be constructed. Miranda (2006) makes particular reference to changes in regulation and energy costs that could affect the expected income from a project. Shaikh et al. (2014) add expropriation of the installation without compensation, unenforceable contracts due to regime change or other regulatory change in the host nation, as well as currency risk. Currency risks include the exchange risk and inability to transfer the currency out of the country to honour debts due to limitations imposed by the local capital bank or the long winded processes needed to facilitate financial transfers.

Shaikh et al. (2014) also include the regulatory and administrative legal environment as well as the presence of physical infrastructure in the category of political risk. Tough restrictions and/or the extent of tariff barriers imposed on foreign investments could render the investment not worthwhile. The lack of the regulatory authority at the time of execution also is a risk that such a body could

evolve during the life of the project and become a constraint to the project and its revenue generation capability.

Physical infrastructure necessary to the construction of the facility and its operation is critical and so is the infrastructure that enables the off-taker to receive the output. If the infrastructure is not available, it renders the project commercially unviable (Shaikh, et al., 2014).

From the brief discussion of a few risks facing funding a power utility, it is evident that project financing includes a lot of mitigation of these risks. Taking from the discussion, market risk is the single most important risk. Without a market, there is no need to even assess any other risk or even proceed (Miranda, 2006). She asserts that off-take agreements are the project funder's mitigation of this risk.

In the agreement, the off-taker, commits to buy part of, or the entire throughput of the utility at agreed prices and conditions over a presumed long period required to pay the loan and cover operations and expenses. Shaikh et al. (2014) simply define off-take agreements as the revenue generating stream of a project company. The authors defines sustainable off-take agreements as off-take contracts that are set at a price, conditions and a duration that the owners should be able to repay the entire debt, maintain operations and expenses whilst remaining profitable.

2.3 Sub-problem: The need for sustainable off-take agreements with alternate electricity suppliers

The extent of the operational and financial problems faced by Eskom is such that it has had to ration electricity supply amongst users with unprecedented frequency (Esk151). This view is supported by (STATSSA, 2015) that reports that electricity supply has been diminishing since record production (262 538 GWh) in 2011. Eskom (2015) cites a five point government intervention plan

that includes “Harnessing short-term independent power producer (IPP) and cogeneration opportunities” (Eskom, 2015, p.5).

Clearly South Africa is in extreme difficulty regarding electricity supply and there are several urgent interventions including the Government’s establishment of the presidency run War Room. It is the author’s contention that IPPs should never just be viewed as short term solutions to the current energy difficult environment, but should rather be seen as a long-term solution. If viewed in that manner then the ensuing agreements will be long term in nature.

Eskom (2015), in the report, contends that it is more expensive to the economy not to have electricity than it is to produce electricity even through firing diesel fuelled open cycle gas turbines(OCGT) as a source base-load electricity, in spite of the OCGTs costing R12.5 billion a year to do so. The IPPs fall under the medium term power purchase program (MTPPP) and the short term power purchase program (STPPP). These are various industries producing electricity. According to the report, all power purchase agreements (PPAs) expired on 31 March 2015. The purpose of the report was to apply for a tariff increase from the national energy regulator of South Africa (NERSA).

The report revealed Eskom’s intention to only extend these agreements by one year, making them the STPPP. The same document mentions that all power producers have requested contracts with durations longer than one year. It is worth noting that Eskom’s purpose for STPPP in the document is to minimise the impact and extent of load shedding.

It is worth noting that the MYPD 3: Re-opener for selective items report was issued on 30 April 2015. There is no mention in the report of extension of contracts before the issuing of the report, except for the request for funding in order to conclude PPA contracts with IPPs. Eskom has not been able to meet demand for electricity and given the view on spending exorbitant amounts to alleviate load shedding (Esk151), it is a fair assumption that there is an informal contract of procuring excess energy from the IPPs.

The irony is that the same report acknowledges that all recovery interventions recommended by the government, including IPPs, require funding. This goes

both ways. IPPs require funding and assurance of a constant stream of income guarantees the essential funding for such ventures (Miranda, 2006). One year contracts and intermittent unofficial contracts in between contract end dates and new agreements do not bode well for alleviating a risk of failure to honour debts from project funding. This form of arrangement would not be sustainable for any new entrant, nor for new ventures seeking capital, at any stage of development or in operation still indebted due to project funding and needing funding for operational costs.

The inability of the state entity to supply electricity is a clear indicator that alternative suppliers are needed to meet the ever rising need for electricity (Esk151). Eskom (2014) asserts that a partnership with a host of stakeholders, including IPPs, is needed to meet current and future demand for electricity. Specifically, in the annual report, the support for environmental sustainability is sought by internal renewable source projects and emphasis on sourcing more electricity generated from renewable sources.

2.3.1 *Duration of sustainable off-take agreements*

The integrated report declares support for government's renewable energy independent power producer procurement program (REIPPP). As shown in table 1, the Department of Energy's program had just over 10 percent spend (R350 million) when compared to the total spend on IPPs (R3.3 billion) since being launched in August 2011. Under this agreement, Eskom is charged to conclude contracts with renewable IPPs.

Table 1: Actual energy procured through IPP programmes in 2013/14 (Eskom, 2014)

Actual energy procured through IPP programmes in 2013/14

IPP purchases	Actual energy purchased (GWh)	Actual cost (Rm)	Actual cost (c/kWh)
MTPPP	1 478	1 217.5	82
STPPP	931	815.6	88
WEPS	139	72.3	52
Municipal base loads	873	771.9	88
RE-IPP	250	350.5	140
Adjustment	–	38.3	–
Totals/averages	**3 671**	**3 266.1**	**88**

It is essential that there is incentive, besides the good will, for the sustainability of these ventures so that the commitments are long term as intended by the Department of Energy (Esk141). Miranda (2006) makes the point that energy installations are not cheap and require a great deal of money for long periods, given long tenures of loan agreements for the installations.

The Renewable Energy Independent Power Producer Procurement Program (REIPPPP) launched by the DoE in 2011 is said to have concluded 64 renewable 20 year IPP contracts with renewable IPP developers (Public-Private Infrastructure Advisory Facility, 2014). This is in stark contrast to Eskom's reports focusing on STPPPs and MPPPs (Esk141) and (Esk151).

2.3.2 *Does Eskom have authority to decide and conclude off-take agreements?*

Nersa (2009) outlines how, amongst other things, it is mandated to provide for and protect the electricity interests and needs of South Africans whilst ensuring sustainability of the electricity industry well into the future. NERSA's objectives in issuing regulatory rules for power purchase cost recovery include transparency and tariff regulation whilst making the electricity supply industry attractive through long term agreements that provide surety for funding arrangements of power producers.

All regulations are under the Electricity Regulation Act no. 4 of 2006, entitled Electricity Regulations on New Generation Capacity (Nersa, 2009). The regulator can allow the power purchase to occur under licence to IPPs and other utilities (Nersa, 2009). However, Nersa (2009) stresses the requirement by Eskom, in its mandate as the country's electricity utility, to purchase power from suppliers as part of the integrated energy plan.

In principle, Nersa (2009) asserts that the regulation of cost recovery in PPAs allows for consideration of risk allocation and cost effective recovery with the full understanding that these costs will have to be passed on to customers. For this reason, the determination of cost effectiveness needs to be a rigorous exercise.

The document then defines a long term contract as a period longer than 3 years. It has to be explored whether this view on duration is uniform between the off-takers and sellers of electricity in the renewable space. It is also worth noting that the STPPP with a defined period of up to 3 years, are excluded from the regulation. In the instance of short term power purchases, the buyers in the PPAs will present costs to the regulator for approval. In execution of these short term agreements, actuals and projections are submitted to Nersa. Any variances are reviewed and approved by Nersa for passing through to electricity users (Nersa, 2009). This was the reason Eskom, in particular, applied for tariff increases in the MYPD reopener application (Esk151).

It is to be understood that Nersa approves cost recoveries by buyers of electricity (Nersa, 2009). This suggests very little, if any, leverage for negotiation or decision between any buyer and seller of electricity in any power purchase agreement. This then necessitates involvement of Nersa in the negotiation and conclusion process between the off-taker and sellers. It would be wasteful for these parties to conclude agreements that will be reversed. It is worth noting that Nersa's regulatory document recommends this (Nersa, 2009).

It would appear to the author that the onus of proving costs falls on the alternate electricity suppliers in their application for refunding to Nersa. The question then remains as to the extent of the decision made by the off taker and the need to negotiate with the off taker, given that for instance, Eskom is required by Nersa

to conclude these contracts as the electricity provider in South Africa yet they cannot make a determination on what they can pay for any costs presented to them.

Is there a difficulty for Eskom here where the tariffs are decided by the regulator and off-take prices are also decided by the regulator? Is it the Regulator's responsibility then to understand and ensure that Eskom is financially sustainable? On this point, it appears that Eskom is not party to the determinant of the price aspect of the sustainable off-take agreement. Does Eskom then determine the period or any conditions that determine the sustainability of the off-take agreement for alternate suppliers?

Under the same regulations, the ministry may impose a PPA to Eskom as an off-taker in consultation with Nersa (Nersa, 2009). The PPA would not be subject to the Nersa regulations process and would be considered authorised as directed by the ministry. This is confirmed by the manner in which the REIPPPP has been implemented. 64 Renewable IPPs have been awarded 20 year contracts by the DOE (Public-Private Infrastructure Advisory Facility, 2014).

2.3.3 *Research Questions*

Sustainable off-take agreements with alternate suppliers are a requirement in South Africa. Three questions arise. The first is whether Eskom is sufficiently empowered to conclude such agreements with alternate suppliers. Secondly, what is the extent of the mandate, authority and influence that Eskom, as the off-taker, has over such transactions and their sustainability? Thirdly, what risks and factors contribute towards the sustainability of ensuing agreements between Eskom and IPPs?

2.4 The dilemma of state utility power supply monopoly

Eskom is part of the Department of Public Enterprises along with Alexkor, Denel, South African Forestry Company Limited, South African Express Airways and Transnet (Department of Public Enterprises, 2015). In the Portfolio of the Department of Public Enterprises (DPE)'s state owned companies (SOCs) Eskom is the biggest generator of revenue (R139.5 billion), profit (R7.1 billion) and the biggest asset base at R504 billion. Eskom and Transnet contribute to 96 percent of the total revenue and 98 percent profits.

Eskom alone scores 68 percent on total revenue and 60 percent of total profit generated by the department (Department of Public Enterprises, 2015), such is the sheer size of this enterprise amongst other enterprises owned by the state. Ironically, the DPE (2015) acknowledges that Eskom has the most difficulty in meeting its mandate and requires the most urgent attention, given the impact of its failure on the economy and the well-being of South Africans.

The department's strategic plan also highlights the over reliance of South Africa on Eskom to generate electricity, current levels at 95 percent generating capacity. The document also highlights the weak financial position of Eskom, having failed to receive the required tariff increases, subjecting it to rely on loans to supplement its build program and operations.

The department outlines its recovery plan as shown in figure 3 (Department of Public Enterprises, 2015). It encapsulates cautious phasing the strategy over five years by stabilising SOEs, strengthening them through growth and solidifying gains by entrenching them to deliver value.

However, before offering solutions, the strategy makes damning admissions on the department's ability to administer SOCs. Included in the list of admissions in the Department of Public Enterprises (2015) are:

- lethargic bureaucratic processes that stifle swift decision making
- Ineffective collaboration
- Poor financial performance
- Poor performance of boards and executive management

- Misalignment of strategy and national objectives
- Weak management of monitoring processes

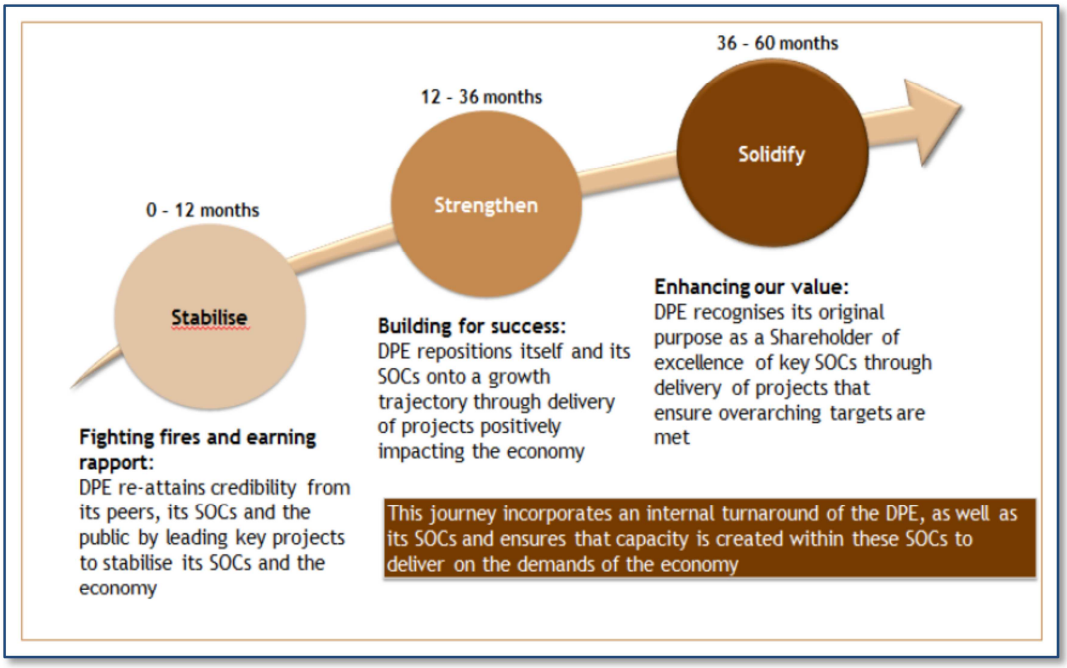


Figure 3: The DPE strategy's envisioned impact on the Department (Department of Public Enterprises, 2015)

The strategy of the DPE does cite internal challenges within the ministry that include the effectiveness of its structure, processes, inefficient systems, and skills challenges. Whilst this is good for the progress and growth of the department, it is encouraging to see the introspection. The ministry looks after crucial portfolios.

If these are the extent of the challenges faced by the Public Enterprises ministry presiding over such critical industries to the economy and the well-being of the country, as asserted by the Department of Public Enterprises (2015), is it logical to place the responsibility of such important enterprises there? The failure of Eskom is effectively the failure of the South African economy and the well-being of its people, given the consequences outlined by the Department of Public Enterprises (2015) of a total black-out and impact of ongoing load shedding.

2.4.1 *2.4.1 Closer examination of state power utility monopoly model*

There are two distinct electricity industry market structures: bundled and unbundled. In the bundled market, the power generating utility controls both transmission and distribution, and by implication, the retailing as well (Power Africa, 2013).

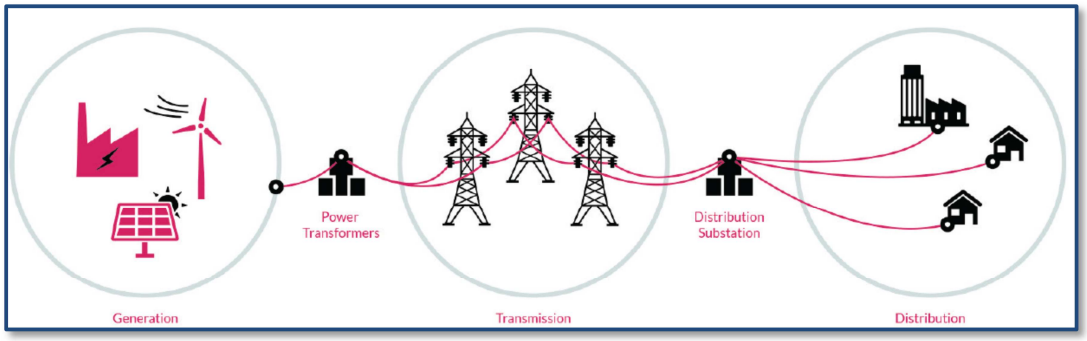


Figure 4: The Electrical Power delivery Supply Chain (Power Africa, 2013)

Is the current model of one enterprise effectively monopolising energy supply sustainable or should the country be looking at other models where other suppliers of electricity enter the market, diversify the energy mix more and increase the spread of electricity so that failure of any single utility does not translate to the failure of the nation?

The example of bundled (vertically integrated transmission) and unbundled electricity supply is shown in figure 5.

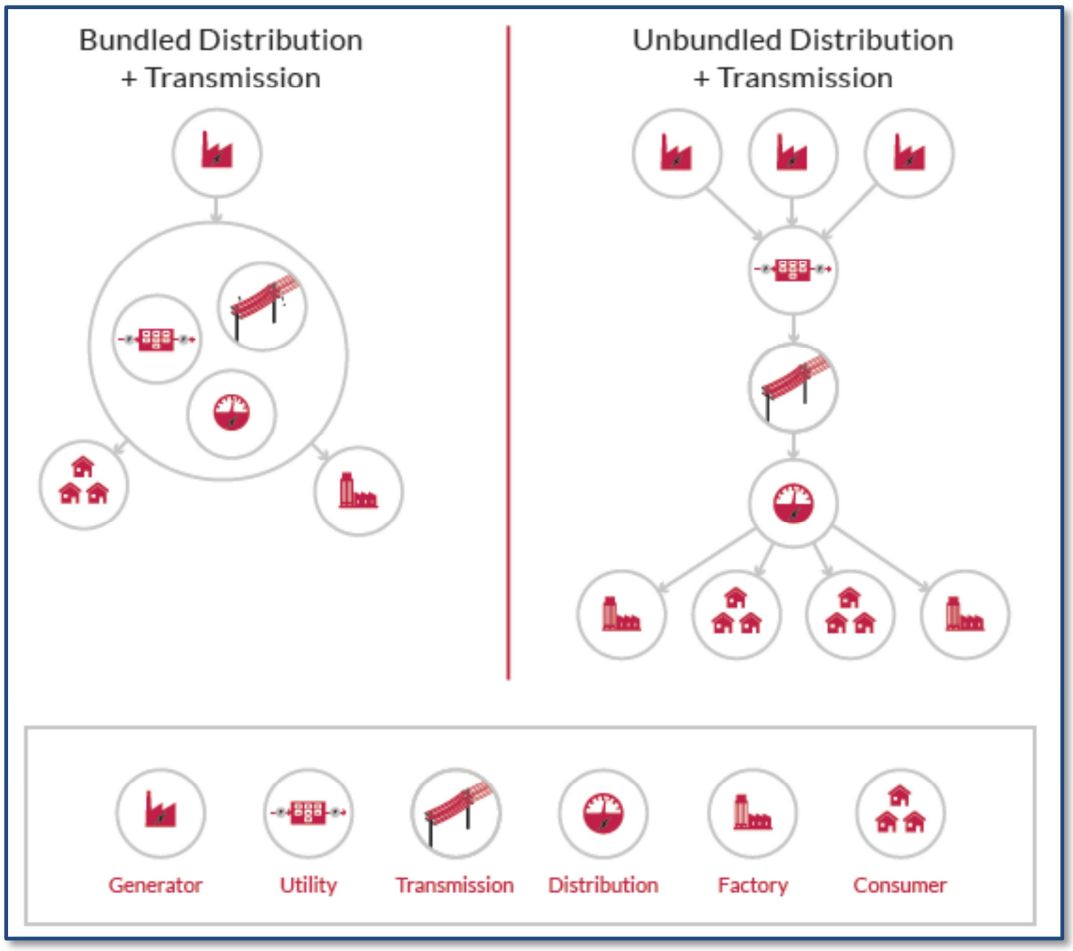


Figure 5: Bundled and unbundled Electricity Provision (Power Africa, 2013)

As an SOC, developing, implementing and achieving strategic goals is no simple feat. These are heavily influenced by the sole share owner, the South African government through the Department of Public Enterprises (DPE) whose mandate is that all SOCs achieve the government's own strategic goals in strict alignment to the national development plan (NDP) and other strategic government documents and plans, mainly the DPE Strategic Plan 2014/2015-2018/2019 (DPE Strategic plan 2014-2019, 2014).

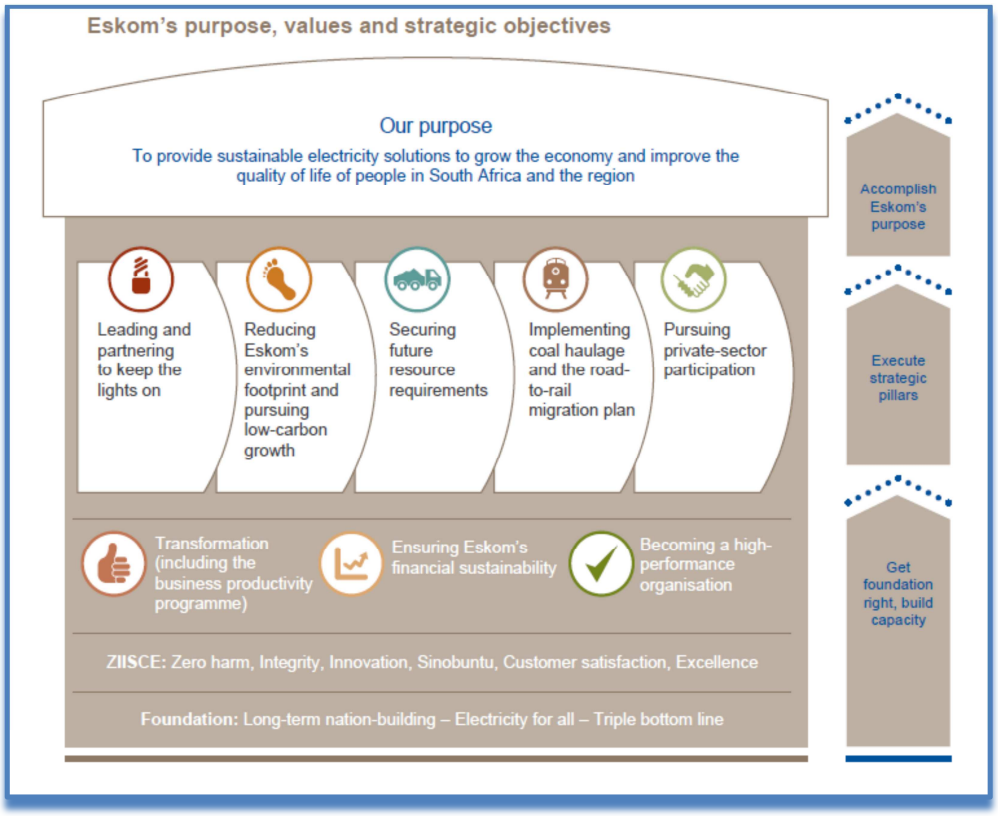


Figure 6: Eskom's purpose, values and strategic objectives (Esk141)

According to the Eskom Integrated Report (2014, p. 23), the purpose of Eskom is to "provide sustainable electricity solutions to assist the economy to grow and to improve the quality of life of people in South Africa and in the region." The purpose is supported by the eight strategic pillars.. The strategic pillars seek to articulate and attain the objectives in a sustainable manner. This is evident in the intention of some of the pillars.

- Private sector participation is essential in the long term sustainability of our economy and possible evolution of electricity supply in the country. Eskom has gone a long way in procuring but also seeking partnership in electricity production, encouraging what are now termed independent power producers (IPPs) to participate in power generation (Eskom, 2014)
- The efforts towards transportation of coal on rail rather than on roads, will be seen to not only result in the reduction of cost and emissions from the vehicles but the damage to Mpumalanga roads will be curbed, making road travel there safer (Eskom, 2014).

- All resources used for electricity generation, ranging from land to fuel must be secured to sustain future generation, transmission and distribution of electricity by the Parastatal and/or others through their network.
- Reducing the environmental footprint and low carbon emissions is Eskom's intent to transition to a cleaner mix of power generating technologies to meet current and future environmental specifications aimed at sustaining the environment
- Equally, the organisation commits to
    - Transform the organisation in line with government imperatives of BBBEE, creation of employment with particular focus on youth development and employment (DPE Strategic plan, 2014)
    - Ensure financial sustainability. This is very difficult given lower than required tariff approvals by Nersa and lower than anticipated credit ratings, resulting in expensive capital (Eskom, 2014).
    - Aspirations of being a high performing organisation.

However one does not have to go very far to see weaknesses in the approach. One glaring point is the effort to keep the lights on and its consequences. This strategic pillar is the direct cause of the current load shedding. Thomas (2012) observes that SOEs are compromised in the aspects of governance, often failing to align themselves with the King Codes of Governance, rather complying with the regulated Public Finance Management Act (PFMA).

Leaders of these enterprises often find themselves zealously pursuing political patronage, missing the point of public service, which is to serving the public. It is this zealous pursuit that resulted in oversight of disciplined maintenance regimes that has cost Eskom, the public, industry and the economy dearly, now that we all have to suffer the rationing of electricity supply until the maintenance and bringing of new power onto the grid leaves sufficient reserve margins in the power supply (Eskom, 2014).

This risk suggests the importance and criticality of focusing attention on developing the industry for such a view rather than sustaining a model that is so flawed where a troubled essential utility is led by a ministry that is as inept as

the DPE seems for the task. It appears to the author that much more effort is required to ensure that sustainable off-take agreements are established to encourage participation in this industry.

The Department of Minerals and Energy (1998) in its White Paper on the Energy Policy of the Republic of South Africa, spelled out that in deriving the policy, three particular aspects were considered:

"Economic, Social and environmental policies and forces; the nature of the South African energy sector and it's linkages with broader forces; and what the sector needs to achieve overall policy goals." (p. 6).

The paper identifies increased opportunities for diversification of supply sources of energy as well as the complexity of multiple fuel opprtunities and the requisite infrastructure. The policy document is clear on the government's intention to provide universal access to electricity to all (Industry, the rich and low income families) in South Africa, as well as the inadequacy of the grid in the provision of that electricity.

Interestingly, the White paper also acknowledges the oppporunity for lifting households out of poverty through the provision of electricity. It does not prescribe how though.

There is a clear assertion by the policy document that refoms are requred to increase competition in the electricity sector, and proposes to restructure Eskom into separate transmission and generation companies as a start of the gradual process. Eskom has yet to be restructured, if at all.

The Department of Minerals and Energy complemented the White Paper on the Energy Policy of the Republic of South Africa with a White Paper on Renewable Energy (Department of Minerals and Energy, 2003). In the Renewable Energy Policy document, the department acknowledges the higher investment costs of renewable technologies and lower operation and maintenance costs. Also, although at the time, the costs of renewable technologies electricity were very expensive, with time these have become more competitive.

Some amount of diversification of elecricity supply had been started by government, the paper reporting that electrification plan included solar photovoltaic systems to rural households.

The same paper makes provision for regulation of pricing arrangments where Eskom either wheels energy on behalf of other parties or buys the electricity from IPPS. Nersa would still regulate pricing (Department of Minerals and Energy, 1998).

Viscusi, Harrington, and Vernon (2005) observe that four main functions are involved in the delivery of electricity: generation, transmission, distribution and retailing. The first is generation which is then transmitted (transported) over long distances as high voltage. Distribution is reticulation and delivery to consumers, which include municipalities, industries and households. In Eskom, this function belongs to Distribution (Esk141). Eskom is both verically integrated and a monopoly.

Viscusi et al. (2005) define the benefits of a regulated natural monopoly as reducing deadweight inefficiencies that would otherwise persist without regulation. In the same vein, they state the unintentional consequences include lack of incentive to be efficient, should the regulated tariff be very high in comparison to input costs.

2.4.2 *Thriving IPPs elsewhere in the world and why they are successful*

Germany is undergoing an energy transition termed ‘energiewende’ (Nordensvärd & Urban, 2015). Nordensvärd and Urban (2015) list the evolution of energy through history from human and animal energy, biological matter (e.g. wood) and then gradually through fossil fuels coal, liquid fuels and gas, nuclear and then ultimately harnessing renewable energy forms. They cite this transition as a constant in developing economies. The article describes how there is a German government driven transition from fossil fuels and nuclear to renewable forms of energy known as ‘energiewende’. Their target is to eliminate nuclear use by 2021 and to have 80 percent energy from renewable sources by 2050

(Nordensvärd & Urban, 2015). The intention is to achieve this through off-take agreements referred to as feed-in-tariffs (Nordensvärd & Urban, 2015).

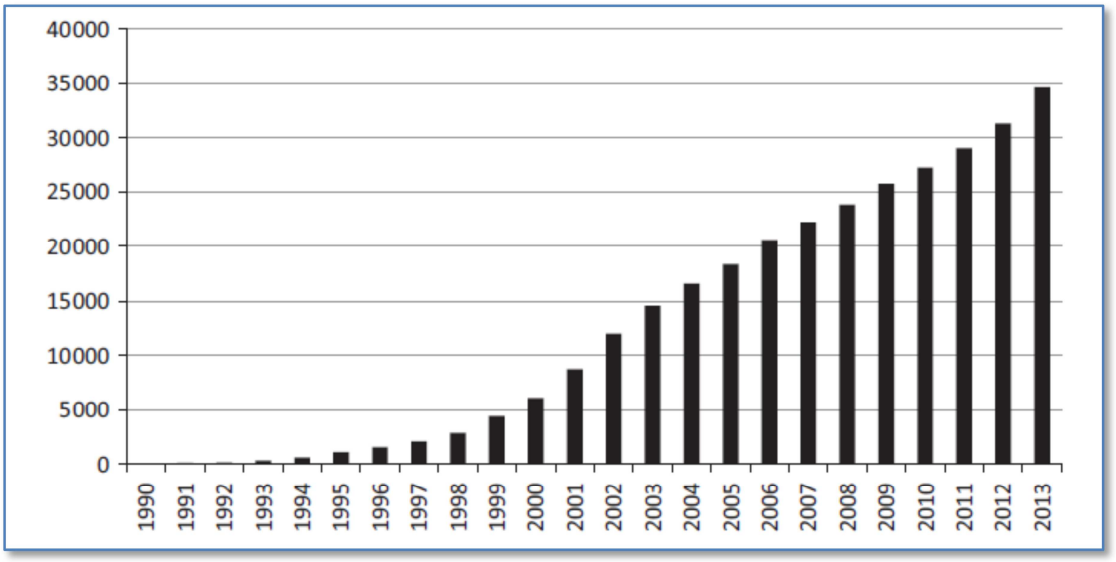


Figure 7: Installed wind energy capacity in Germany in MW (Nordensvärd & Urban, 2015)

Figure 7 shows how, from humble beginnings in the 1980's, the wind energy capacity has thrived in Germany to reach 35 GW (Nordensvärd & Urban, 2015), which is over 83 percent of Eskom's maximum capacity of 42 GW (Esk141). To date, Eskom produces 100 MW from wind energy since commissioning its wind energy facility, Sere, in the Western Cape (Creamer, 2015). This amounts to 2.3 percent of Eskom's total electricity capacity. Much of the success in the sector can be attributed to the German renewable energy law (EEG) (Nordensvärd & Urban, 2015).

It goes without saying that the Germans have set themselves high targets for renewable energy generation and they are far from satisfied with the achievement. Nordensvärd and Urban (2015) detail their concerns about the structure of feed-in-tariffs and the barriers they have termed carbon lock-in. The article contends that the lock-in impedes faster progress of transition to renewables, favouring fossil fuel dependent electricity generation.

Whilst there is strong political will and support for transition, as well as suitable legislation in the form of EEG and Energiewende policy, Nordensvärd and Urban (2015) believe a lot more can be done if infrastructure upgrades are done to support wind energy to generate electricity transmission and distribution. If the carbon lock-in and other barriers to renewable energy roll out are removed, the industry would grow at even faster rates. Nordensvärd and Urban (2015) found, in their research, that most respondents acknowledged that the sustainability of the renewable energy supply industry in Germany depends on the EEG, fearing changes to that renewables energy law in the future would render the renewable energy plan a failure.

Kilic (2011) states that Turkey is heavily dependent on fossil fuels for energy consumption. They are dependent on imports for 75 percent of this raw form of fuel (Kilic, 2011). In 2008, the country spent 48 billion US dollars on the importation of energy. The Turkish government wants to reduce energy transportation costs and has decided to incentivise generation of energy from renewable sources (Kilic, 2011). According to the article, incentives can vary from country to country and in general, vary between the three: financial, taxation and production incentives (Kilic, 2011).

The full list of initiatives in place for incentivising renewable electricity generation include:

- Feed-in tariffs and purchase obligations;
- Connection priority;
- Reduced licence fees;
- Exemptions from licence obligation for small-scale generators;
- Reduced fees for project preparation and land acquisition

Senatla (2011) asserts that the uptake of renewable electricity needs to be expedited if sustainable use in the residential sector is sought. The article decries the reliability and costs of renewable energy technologies. It observes and cites a transition in Gauteng's economy from resource-intensity to skills-intensity. The implications are that energy consumption will see a transition from

industry to commercial and residential areas. The report then observes that the mobility to renewables in Gauteng implies mobility of renewable energy use and uptake in these sectors.

Davidson, Winkler, Kenny, Prasad, Nkomo, Sparks, Howells and Alfstad (2006) in their paper, define a sustainable energy system as one that supplies current needs without negatively impacting future generations. They suggest that real costs of energy must be quantified, including environmental impact and provision of energy must be in alignment with national development goals. This, they suggest, requires scenario development for future energy availability, needs and available technology assessment. They then suggest that the private sector must be informed of this information and afforded the opportunity to implement solutions.

Winkler (2005) suggests that, in order to encourage renewable power generation in South Africa, the government must set targets. He then recommends three policy instruments used in developed countries:

- Feed in tariffs – Off take agreements with differentiated rates for the various technologies. This, he observes, has led to renewable technologies thriving in European countries, especially Germany.
- Renewable energy portfolio standard (REPS) is a standard set by government for allocation of the percentage of electricity from renewable sources in the grid
- Renewables obligation – a process wherein government issues tenders for supply of electricity specifically set aside for renewables.

The article recommends the REPS option for South Africa but does not rule out the success of other options. His recommendation is driven by the assertion that government would have to limit expenditure on renewables. This statement alone contradicts how the entire article seems to project itself as advocating for increasing electricity generation from renewable sources.

South Africa's integrated resource plan (2010 to 2030) for electricity as mandated and produced by the Department of Energy requires that the private sector and renewable energy be central to electricity production (Public-Private

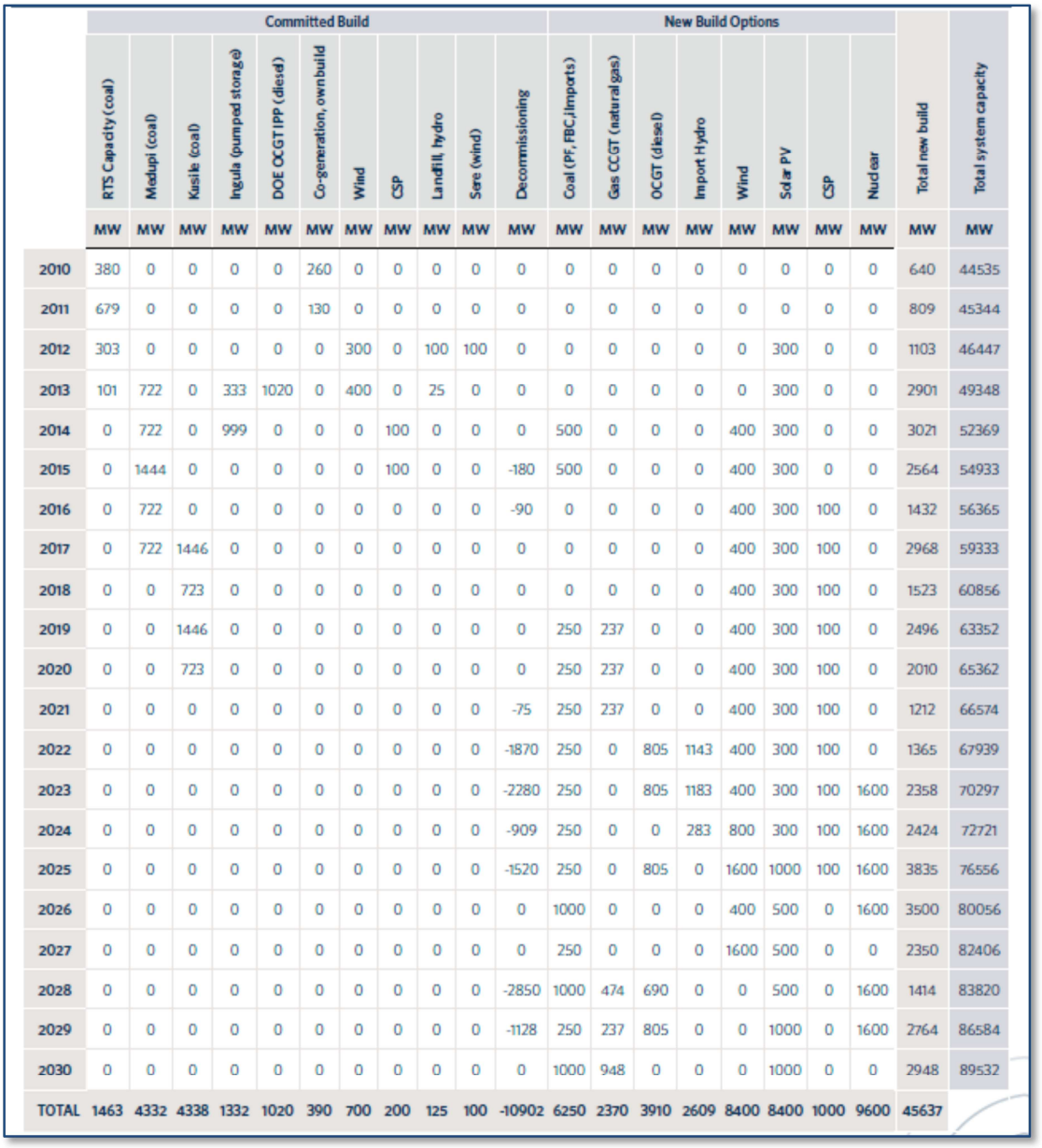
Infrastructure Advisory Facility, 2014). According to this report, Nersa approved renewable feed-in tariffs that sought to cover operational costs plus a return on equity of 17 percent with a price adjustment for inflation. These were viewed as generous and supportive to renewable ventures (Public-Private Infrastructure Advisory Facility, 2014).

In 2011, Nersa revised the tariffs for all renewable energy sources; wind was reduced to 25 percent, concentrated solar by 13 percent and photovoltaic by 41 percent. The 17 percent return on equity inflationary adjustment was also removed (Public-Private Infrastructure Advisory Facility, 2014). After this re-issue, the Department of Energy felt the tariffs were too high. The Public-Private Infrastructure Advisory Facility (2014) reports that, after consultation, late in 2011, the Department of Energy announced a new approach, that of competitive bidding, known as the Renewable Energy Independent Power Procurement Program (REIPPP).

The report points out that there is general comfort with the South African government's credit rating whilst there is some concern about Eskom's financial standing and potential unbundling of the organisation and cession of rights (Public-Private Infrastructure Advisory Facility, 2014). To this end, developers are very concerned about Eskom being the off-taker and have expressed comfort with the DOE guaranteeing the agreements (Public-Private Infrastructure Advisory Facility, 2014).

The REIPPP, amongst other things, focuses on local content and community development (Public-Private Infrastructure Advisory Facility, 2014). Table 2 articulates the DOE targets for renewables well into 2030. The sum total of the electricity production from renewable energy in the plan is 17.8 GW. This is four times the capacity of planned capacity of Medupi Power Station.

Table 2: 2012 South African integrated resource plan (Public-Private Infrastructure Advisory Facility, 2014)



	Committed Build											New Build Options									
	RTS Capacity (coal)	Medupi (coal)	Kusile (coal)	Ingula (pumped storage)	DOE OCGT IPP (diesel)	Co-generation, own build	Wind	CSP	Landfill, hydro	Sere (wind)	Decommissioning	Coal (PF, FBC, Imports)	Gas CCGT (natural gas)	OCGT (diesel)	Import Hydro	Wind	Solar PV	CSP	Nuclear	Total new build	Total system capacity
	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
2010	380	0	0	0	0	260	0	0	0	0	0	0	0	0	0	0	0	0	0	640	44535
2011	679	0	0	0	0	130	0	0	0	0	0	0	0	0	0	0	0	0	0	809	45344
2012	303	0	0	0	0	0	300	0	100	100	0	0	0	0	0	0	300	0	0	1103	46447
2013	101	722	0	333	1020	0	400	0	25	0	0	0	0	0	0	0	300	0	0	2901	49348
2014	0	722	0	999	0	0	0	100	0	0	0	500	0	0	0	400	300	0	0	3021	52369
2015	0	1444	0	0	0	0	0	100	0	0	-180	500	0	0	0	400	300	0	0	2564	54933
2016	0	722	0	0	0	0	0	0	0	0	-90	0	0	0	0	400	300	100	0	1432	56365
2017	0	722	1446	0	0	0	0	0	0	0	0	0	0	0	0	400	300	100	0	2968	59333
2018	0	0	723	0	0	0	0	0	0	0	0	0	0	0	0	400	300	100	0	1523	60856
2019	0	0	1446	0	0	0	0	0	0	0	0	250	237	0	0	400	300	100	0	2496	63352
2020	0	0	723	0	0	0	0	0	0	0	0	250	237	0	0	400	300	100	0	2010	65362
2021	0	0	0	0	0	0	0	0	0	0	-75	250	237	0	0	400	300	100	0	1212	66574
2022	0	0	0	0	0	0	0	0	0	0	-1870	250	0	805	1143	400	300	100	0	1365	67939
2023	0	0	0	0	0	0	0	0	0	0	-2280	250	0	805	1183	400	300	100	1600	2358	70297
2024	0	0	0	0	0	0	0	0	0	0	-909	250	0	0	283	800	300	100	1600	2424	72721
2025	0	0	0	0	0	0	0	0	0	0	-1520	250	0	805	0	1600	1000	100	1600	3835	76556
2026	0	0	0	0	0	0	0	0	0	0	0	1000	0	0	0	400	500	0	1600	3500	80056
2027	0	0	0	0	0	0	0	0	0	0	0	250	0	0	0	1600	500	0	0	2350	82406
2028	0	0	0	0	0	0	0	0	0	0	-2850	1000	474	690	0	0	500	0	1600	1414	83820
2029	0	0	0	0	0	0	0	0	0	0	-1128	250	237	805	0	0	1000	0	1600	2764	86584
2030	0	0	0	0	0	0	0	0	0	0	0	1000	948	0	0	0	1000	0	0	2948	89532
TOTAL	1463	4332	4338	1332	1020	390	700	200	125	100	-10902	6250	2370	3910	2609	8400	8400	1000	9600	45637	

In the REIPPP, government has imposed such low prices in each round that there is increased risk of not delivering (Public-Private Infrastructure Advisory Facility, 2014). The article reveals that government's appetite for lower prices is influenced by lower relative costs in other countries. This appetite however ignores the imposed Social imperatives and localisation. The program can only

be sustainable once the agreements can sustain the ventures, most of which will be sourcing funding from project finance. This view is negated by Walwyn and Brent (2014) who argue that the cost of renewable energy is becoming economic and will reach new coal build costs by 2016.

In the era of transient advantage and the internet of things, (Favaro, 2014) and (McGrath, 2013), it is highly unlikely that Eskom will remain in the same format as it currently is, in the future. The models of the product offering will require re-examination. The energy internet is the more revolutionary concept (Huang, Thomas, Dale, Crow, & Zheng, 2011). The idea is that households and individuals will have more control of their energy needs in an interconnected network of plug and play set-up with all manner of storage devices and access to renewable energy sources in homes and the general infrastructure. Figure 8 demonstrates the concept. Huang et al (2011) suggest an empowering feature will be the ability to sell some of the excess electricity back into the grid.

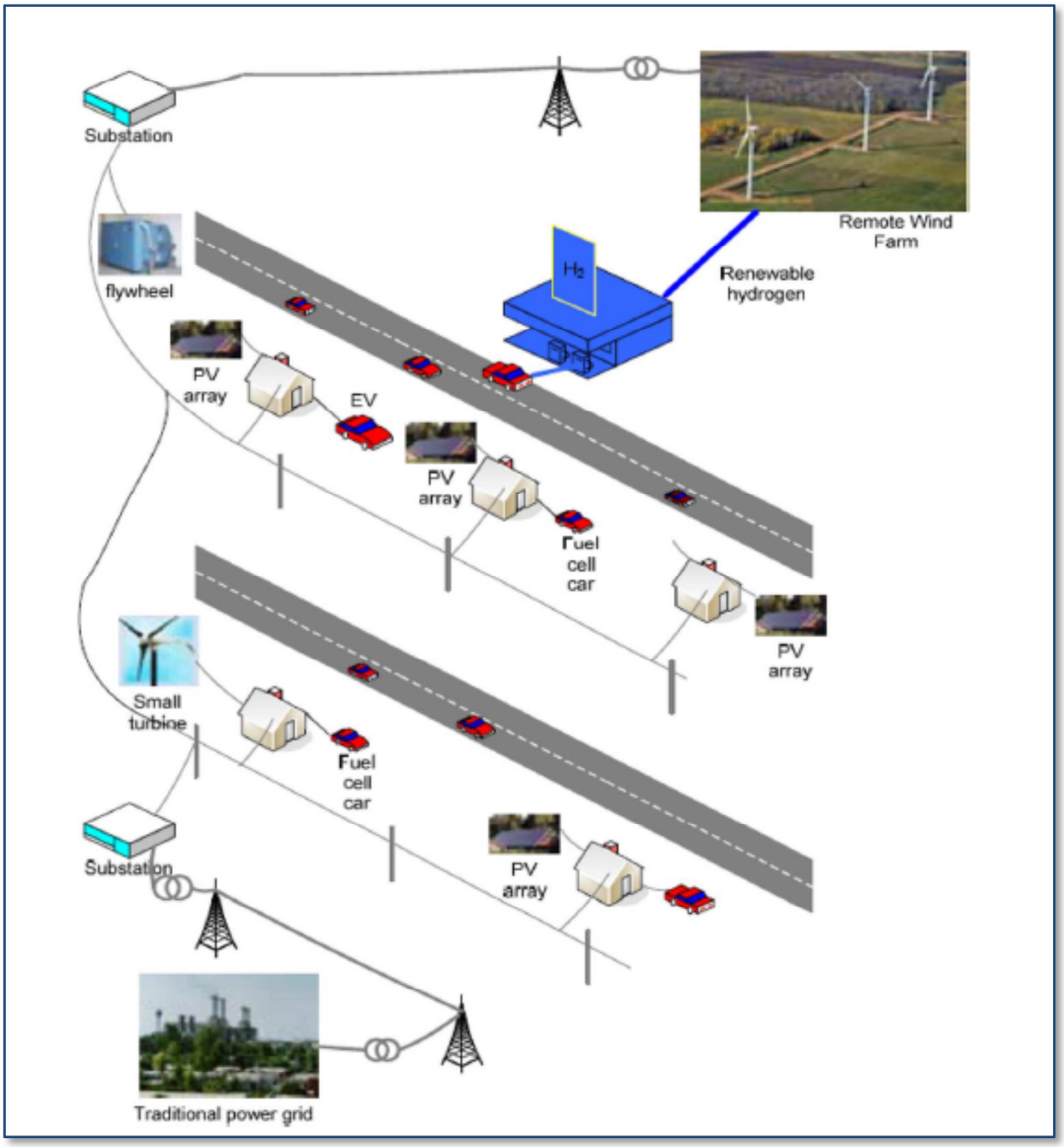


Figure 8: Envisioned energy internet (Huang et al, 2011)

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2.4.3 *Proposition*

The vertical integration and monopoly of Eskom is unsustainable in the long-term, renewable energy from alternate suppliers will be the disruptive innovation to the extent of breaking the monopoly of Eskom.

2.5 Conclusion of Literature Review

The concept of off take agreements derives from project funding and risk management assuring funders of ventures that debts will be serviced by off-take, rendering the venture sustainable. Of the several risks facing any new venture, the most important is the availability of the market for revenue generation. Off take agreements are meant to address that risk in particular with an assurance of purchase. The sustainability of such agreements is heavily reliant on the rates and durations.

Eskom as the mandated electricity producer and supplier is also mandated to be the off taker, either through its own contracts with IPPs or those concluded by the DOE. In either instance, Eskom does not have authority to determine pricing. Nersa and the DOE through their internal processes determine pricing. The DOE goes to the extent of concluding IPP contracts and the contracts on behalf of Eskom. This is done through the REIPPP. To this end, 64 contracts have been concluded by the DOE with renewable energy IPPs. This brings the question as to extent of the authority, role and influence of Eskom in the negotiations and conclusion of off take agreements.

Eskom is the biggest and, arguably the most important SOC, under the DPE. The frailties of the DPE are well documented even by the department's own strategy. That brings to question the department's ability of managing the enterprise as it navigates the difficulties it finds itself in.

The world over, and specifically in Germany, the success of renewable IPPs has largely been through the support of legislation, government policy and political will, in general. Those environments are privatised as the state legislates and the private enterprises see to the development goals of those countries. Off take agreements are made sufficiently attractive to the private sector and supported by government's own tough targets for energy transformation towards renewable energy. Incentives also help as can be seen in studies of Turkey.

In the era of rapid change and the internet of things, there is a thriving concept of the energy internet. It becomes clear that Eskom, in the form in which it currently exists, as a vertically integrated monopoly, cannot be sustained. The inclusion of the private sector is important for this country's future energy needs, particularly, the renewable energy sector.

2.5.1 *Research Questions:*

Sustainable off-take agreements with alternate suppliers are a requirement in South Africa. Is Eskom sufficiently empowered to conclude such agreements with alternate suppliers? And what exactly is the extent of the mandate, authority and influence that Eskom, as the off-taker, has over such transactions and their sustainability? What risks and factors contribute towards the sustainability of ensuing agreements between Eskom and IPPs?

2.5.2 *Proposition:*

The vertical integration and monopoly of Eskom is unsustainable in the long-term, renewable energy from alternate suppliers will be the disruptive innovation to the extent of breaking the monopoly of Eskom.

CHAPTER 3. RESEARCH METHODOLOGY

This section describes the methodology that was used in conducting this research. It describes the methodology used in addressing the proposition and questions arising from the literature review. There is a discussion of literature supporting the selected method. The research design and the research instrument is reviewed. Finally, data collection is discussed, along with the examination of the validity and reliability of the research as planned and implemented.

3.1 Research methodology /paradigm

This research used a qualitative methodology. Creswell (2014) points out that there are three approaches to research: qualitative, quantitative and mixed methods. Qualitative research as a method is exploratory and open ended in nature, seeking answers to occurring phenomena in natural settings and studying their complexity (Leedy & Ormrod, 2005). Leedy and Ormrod (2005) recommend qualitative research when little, or no, information is available.

The open ended nature and complexity of the issues is best studied using qualitative methodology in the determination of the research questions and proposition as generated in the literature review. Interpretation of the information, emergent issues and results cannot however be generalised to other settings.

3.2 Research Design

Interviews were used to gather data. Interviews are a qualitative research approach where the researcher will gain insight from subject matter experts residing in areas of influence and participating in phenomena as they unfold (Creswell, 2014). The qualitative interviews were mostly face to face with only two via telephone. Interviews were open ended and unstructured with few questions to allow for insight, views and opinions from participants (Creswell, 2014).

The selected and appropriate design for this research was phenomenological research. It sought the experiences of individuals in their experience of the phenomenon of negotiations and conclusion of contracts or even their perception of the events, given their experience and/or privilege of experience.

Advantages of interviews as suggested by Creswell (2014) include:

- participants provide historical information usually not sought by the interview
- The researcher can flow in the interview having control of the questioning
- Non-verbal communication (e.g. discomfort, demeanour, etc.) otherwise unattainable or not documentable in other forms of enquiry can be observed and documented.

The disadvantages though, include (Creswell, 2014):

- Not all interviewees are articulate in giving information
- Researcher's presence could bias responses, where they could have been candid, they might be defensive on the interview day
- The information provided is subjective and is as viewed by the participant

The open ended nature of interviews allows for exploration of some of the historical, contextual and any issues that may arise from the complexity of the research questions and those to be raised arising from the literature review.

Nordensvärd and Urban (2015) use qualitative interviews in their research.

3.3 Sample and sampling method

A sample of experts is adequate for this study. The identified population were approached. They were not random. The key criterion was possession of expertise and participation in the industry. Table 3 outlines the research sampling criteria and the profile of respondents. 14 respondents were adequate for the study, at least one from each category.

Table 3: Profile of respondents

Role	Criterion	Respondent Details
Engineers and/or Project Managers	Currently or recently involved in execution of renewable Projects and/or Electricity industry Projects.	**Respondent no. 1: Lwando Limba** Middle Manager Projects: Concentrated Solar Project, Eskom **Respondent no. 2: Lionel Jordaan** Chief Engineer: Senior Consultant Generation Division, Eskom **Respondent no. 3: Yvon Gombele** Project Manager: Concentrated Solar Project (Contracts). Previous Project: Sere Windfarm Project (Contracts). Eskom **Respondent no. 4: Niranjan Sentoo** Project Engineer: Concentrated Solar Project. Previous Project: Sere Windfarm Project. Eskom
Project managers and/or Project Engineers	Currently involved in execution of renewable projects and previously with IPPs	**Respondent no. 5: Jose Muse Dios** Engineering Manager: Concentrated Solar Project. Eskom. (Consultants to Eskom Employed by Tractebel Engineering SA). Formerly with Tractebel NG (an IPP) **Respondent no. 6: Federico Sandoval** Project Manager: Concentrated Solar Project. Eskom. (Consultants to Eskom Employed by Tractebel Engineering SA). Formerly with Tractebel NG (an IPP)
Senior and Executive Manager	Energy Planning, Trading and Procurement, Electricity Grid code,	**Respondent no. 7: Callie Fabricious** General Manager: Electricity Planning and Market Development, Eskom

	IPPP processes.	**Respondent no. 8: Bernard Magoro** Corporate Specialist- Grid Code, Eskom **Respondent no. 9: Respondent A** Respondent A requested Anonymity. Respondent A, a senior Eskom Corporate Specialist is involved in Trading and Procurement of Electricity.
Managers and executives	Intention to or actual participants in power purchase agreements.	**Respondent no. 10: Respondent B** Senior Advisor Projects. Establishing an IPP. Identity held back to protect Respondent B. **Respondent no. 11: Matome Modipa** Chairman: Sebata Group of Companies. Involved in energy sector Projects. Interested in RE Projects. **Respondent no. 12: Nandu Bhula 10** Managing Director: Aquapower (an IPP). Former Eskom Senior General Manager, Generation Division, Eskom **Respondent no. 13: Clifford Makoloane** Managing Director: GDF Suez Operations (an IPP). Former Chief Advisor Business Analysis, Generation Division, Eskom
Energy expert	Conversant with activities in the IPP/Renewable energy space in South Africa	**Respondent no. 14: Chris Yelland** Energy expert and Managing Director of EE Publishers the Publishers of EngineerIT, Energize, Vector and PositionIT magazines

3.4 The research instrument

There a three types of instruments: observation schedule, interview schedule and questionnaires (Creswell, 2014). The research instrument that was used was an interview questionnaire, attached here in Appendix A. It was open ended with a few questions related to the proposition and research questions.

A recorder was used in some of the interviews as permitted by the participants for the single purpose of transcribing the interview. Observing behaviour during the interview is part of the data collection, asserts Creswell (2014), making the researcher the main research instrument.

The structure of data collection was exploratory and unstructured as opposed to the other two: fully structured and semi-structured (Creswell, 2014). The advantages of interviews is the open-ended nature of the discussion and how much can be learned especially once trust and rapport has been established (Leedy & Ormrod, 2005). As cited in section 3.1, trust and rapport are very important. The interview has an advantage in that non-verbal communication can also be detected. If the rapport is not established or if the person is not articulate or even has a speaking impediment that poses a challenge for communicating which will justify any other means of “interviewing” the participant.

Questions were designed from the research question and proposition as well as outcomes of the literature review.

Ethical considerations are very critical. Code of ethics as prescribed by the American Sociological Association (ASA) was complied with (Creswell, 2014). The purpose of the interview was declared. Self-disclosure and intentions were first disclosed and then consent was sought and granted before each interview.

Once granted, the interviews took place, with full consideration of prevention of any harm to the respondents. The author recorded the interviews and permission to do so was sought. The information in connection with respondents was handled with the expressed discretion and care.

3.5 Procedure for data collection

Appointments were sought with the identified candidates and face to face interviews were preferred. In some instances it was not feasible to meet in person, all measures were taken to attempt to connect and have a verbal interaction with participants.

3.6 Data analysis and interpretation

The interviews were transcribed. The author intended sharing the transcriptions with the participants to solicit confirmation of understanding. Creswell (2014) suggests that qualitative researchers sort data detecting themes, categories and patterns. He recommends some sort of diagrams for visualisation. Deductively the researcher then seeks a connection between the data and the various themes to use as analysis and evidence of a view that prevails or outcomes that are findings.

Creswell (2014) outlines the following process in data analysis:

a. Prepare data for analysis
b. Assess and read all data notes and observations
c. Code data – segment and categorise data
d. Generate themes and descriptions
e. Narrate representation of themes and descriptions in a discussion that interconnects themes
f. Interpretation. Deduction of what were the findings and results.

3.7 Limitations of the study

The sample was limited to respondents possessing knowledge, having an interest and subject matter experts. All together 14 respondents participated.

Some information might not have been received as communicated. The author will have interpreted responses which were documented and there is a potential

of misinformation. There might not be sufficient time to cover all aspects as intended.

3.8 Validity and reliability

Creswell (2014) emphasises the strengths brought to research by validity. Trustworthiness, authenticity and credibility are examined in the determination of validity of information gathered. Some of the suggested methods by Creswell (2014) include:

- Awareness of the researcher's bias and honesty in self-reflection
- Attention to detail and rich findings with alternatives improve credibility
- Caution to also present information that counters themes
- Spending extended periods in the field
- Peer debriefing to enhance deeper understanding of the phenomenon
- Checking, which includes re-interviewing to confirm positions or sending transcripts for verification

Reliability refers to consistency throughout the research process and in all interviews of participants (Creswell, 2014). It is imperative that the author is mindful of both validity and reliability for the sake of the credibility of outcomes.

3.8.1 External validity

Having studied external validity and its threats in Creswell (2014), the extent of external validity for this research is restricted to the context of Eskom and the South African situation currently. It is unlikely that the information gathered about off take agreements in the context discussed in this research as well as the findings will be globally transferrable. For one, the sample is not random. The sample was determined and approached. The sample size was very limited. It is also unlikely that determinations made with limited research can be replicated in future studies.

3.8.2 Internal validity

Internal validity, in so far as it is understood by the author, is any circumstance that may threaten the author's inability to draw the correct information from participants (Leedy & Ormrod, 2005). The author believes the study is internally valid, unless the questions become leading, then there may be bias in the outcomes.

3.8.3 Reliability

The tool used in this research was interviews. It is unlikely that the views of candidates could change. It is probable that the same questions posed to the same people would yield similar responses. The researcher strove to be consistent in all interviews in an attempt not to have negative impact on the reliability of findings (Creswell, 2014).

CHAPTER 4. PRESENTATION OF RESULTS

4.1 Introduction

This chapter focuses on presenting findings of the research. Firstly, the profile of respondents is presented. Then the findings are presented for the research questions and proposition. The raw data was obtained from interviews conducted with respondents. The research instrument is attached in Appendix A. All interviews were transcribed and the research supervisor had access to the raw data. However, a decision was made not to attach the transcripts that averaged 10 pages each for 14 respondents.

All responses from the 14 respondents relevant to the proposition and research questions were drawn from the raw data and presented. Common themes were drawn together and differing views also presented per research question and theme.

The research questions sought to address two issues: the authority and influence Eskom has to influence and conclude sustainable agreements with IPPs. The second issue in the first research question sought the address factors that result in sustainable agreements between IPPs and Eskom, the off-taker of the produced electricity.

The proposition addressed the question of a sustainable model for electricity supply in South Africa

4.2 Results pertaining to Research Questions

The research questions sought to address two issues: the authority and influence Eskom has to the negotiation of sustainable agreements with IPPs. The second issue the research questions sought to address was factors that result in sustainable agreements between IPPs and Eskom, the off-taker of the produced electricity.

4.2.1 Issue 1: Eskom's authority and influence

The question of Eskom's authority and influence in negotiating with IPPs drew results that differed and could be grouped into three categories. The first category asserted that Eskom had authority. The second category suggested that Eskom only had influence, whilst the last category contended that Eskom had neither influence nor authority in the negotiations.

4.2.1.1 Category 1: Eskom has Authority

The one respondent that asserted that Eskom is very powerful, drew from practical experience of an attempt made in a venture to contract with wheeling agreements with Eskom. Wheeling agreements are contracts between Eskom and an alternate producer that seeks only to use Eskom's network to deliver electricity to a consumer (Eskom, 2012).

Apart from battling to reach the correct contact within Eskom, they faced two serious obstacles. The first was complying with Eskom's stringent Grid Code. The second was whether there was capacity on the particular Eskom network lines they were targeting for the wheeling agreement.

The second respondent asserted that Eskom, the monopoly and owner of vast electricity infrastructure in the country, was the custodian of the off-take agreements and inferred that Eskom is surely in charge of the contract strategy formulation.

4.2.1.2 Category 2: Eskom only has influence

One of the respondents that supported the view that Eskom had influence in the negotiations spoke purely on the principle that one party should not dominate the outcome.

'*A contract is an agreement and all parties should be satisfied*.'

The same respondent also added that Eskom was involved in negotiating various types of contracts locally and internationally. Eskom's experience could not be doubted and does have influence; He added that there is in fact a 3-way arrangement between parties in the REIPPP. The IPP and the DoE have a

separate contract, Eskom does not have a role or access to that contract. Then there is the PPA between Eskom and the IPP.

Another respondent remarked that Eskom was not in a strong position where negotiations with IPPs were concerned. First, the IPPs were not invited by Eskom, the DoE was in charge of the REIPPP. Second, it was evident in recent times because of load shedding that additional sources of electricity were a necessity. Therein lay the impression of desperation from the Eskom side to procure extra electricity. The desperation on the government side could fuel a bold stance by IPPs during negotiations, leaving Eskom with little influence, beyond technical requirements.

> '*The question itself did not imply that Eskom would be overruled, but the impression was created that there was a clear intention from the DoE to enquire the IPPs that we need power desperately*.'

The one thing that counts for Eskom would be that, IPPs do not desire the obliteration of Eskom, given that Eskom must sustain them. Should Eskom be broken up, there would be serious problems receiving payment for electricity. This added to Eskom's influence.

> *'Eskom has influence but no authority. The DoE signs the PPA. The DoE has the authority.'*

The REIPPP is led by the DoE, it is clear to this respondent that Eskom can only influence. The decision authority rests with the DoE. To the following respondent, there is certainly some influence but the IPP office controls the program.

> '*Our influence is to the extent that we are the off-taker and own the balance sheet otherwise the PPA's cannot fly. We have to play a buyer role drafting contracts. And in reality our role is very big. We maintain and operate the network; we are the main supplier and distributor of electricity. The correct position would be with parties contracting directly with Eskom.'*

The respondent added that Eskom has influence, especially technically. Other areas that limit Eskom's authority include the bankability of the project, and limitation on substantive input on the sustainability of the resulting agreement. The voice of Eskom is sometimes not loud enough, granted the extent of the connections and perceived influence that IPPs have on the DoE and/or Nersa when concerns raised by Eskom are ignored.

This is evident in the extent of the one sided risk in PPA agreements tantamount to if anything goes wrong including changes in law, availability of natural resources (fuel to RE technologies) the impact is felt by Eskom. Eskom is required to take the risk even when the IPP connections are on municipal networks.

> '*Why is it an issue to Eskom? Municipalities are largely bankrupt and incapable of maintaining and operating their power transmission networks. Eskom has to pay whether the IPPs supply or not whilst Municipal networks are down and/or unavailable*.'

During the REIPP program roll-out initial phases, Eskom emphasised the criticality of the scheduled commercial operation date (SCOD) to parties in a PPA. This is the time scheduled for both parties, the IPP and the provider of the network to agree they will be ready to provide and transmit electricity respectively. The DoE was advised to be cautious when it came to the municipalities' ability to deliver the network.

> *'Often, when the scheduled date is reached and there is no transmission infrastructure Eskom is required to pay for what is known as Deemed Energy, power that the IPP would have produced and supplied had infrastructure been in place. After these lessons were learned, Eskom was vindicated in all it had warned and the DoE is beginning to listen.'*

As a result, the DoE became more reluctant to allow IPPs to connect to municipal grids under the REIPPP. This strengthens the view that Eskom has some measure of influence, albeit retrospective, in several instances. The finding emphasised that these errors would not have happened had Eskom had the authority to negotiate and place the contracts themselves.

4.2.1.3 Category 3: Eskom has little or no say

One of the findings was the contention that Eskom in fact had neither authority nor influence in the negotiation and conclusion of the agreements with IPPs. The authority on the extent to which these agreements are negotiated and concluded lies with the DoE.

> '*The DoE is the purchaser/procurer, drafting all the agreements. The DoE develop the program, negotiate the contracts and then hand over to Eskom for signing. Eskom's role really is that of a buyer from the IPPs and seller to consumers of electricity. I can't say that Eskom has influence on the extent to which the negotiated outcomes of the PPA's is sustainable. Perhaps the extent of the influence is technical compliance not the selection and procurement process.'*

This relegates Eskom's involvement in the process to being an acceptor of agreed terms and management of the PPA's but not driving the procurement process. Government has complete control of the program whilst Eskom becomes the means through which the REIPPP is rolled out managing PPAs.

This is consistent with all operating regimes from selling directly to Eskom to wheeling agreements, wherein alternate generators and suppliers of electricity are required to find their own electricity consumers in private bilateral trade agreements. In this regime, Eskom is not involved with parties or their agreements. Nersa regulates the agreement and Eskom becomes the provider of the network and charges the generating party for transmitting the electricity. Eskom does regulate the compliance of produced electricity to the Grid Code.

> '*There are different operating regimes and methods. IPPs come in and they are told to find a customer. The relationship is regulated by NERSA and they use Eskom's network. Only Eskom has the transmission and distribution network. Power is regulated and prices are regulated. Therefore Eskom cannot have authority.*'

Another respondent made the point that Eskom could not possibly have influence during negotiations. Eskom is an SOE that is governed by a mandate that is other than profit making.

> *'I don't think when Eskom sits around the table they have a muscle (influence). Sitting around the table, Eskom starts on a negative footing when it comes to negotiations purely on the basis that Eskom's shareholding is by the government up until Eskom's mandate is defined whether we are a profit making organisation or a state owned organisation supposed to help fulfilling Government's promises to the South African public. That creates an issue from the very onset. If you look at an IPP agreements in the RE space, they are not geared in any way in assisting Eskom to become a profit making organisation. If anything, Eskom is making a loss in the PPAs.'*

All of this stems from the fact that the IPP program as driven by the DoE commenced because of electricity shortages in the country as evidenced by black-outs. Because Eskom did not have the required extra capacity, it could not have any say. However, Eskom's involvement comes as a result of its extensive network. This is the only way that these IPPs can deliver their electricity to consumers, municipalities, industries and people's homes.

> *'The DoE, although they have direct contracts with IPPs within the respective energy mix allocations, Eskom comes in as a third party. When Eskom goes for MYPDA, there's an Eskom cost and there's an IPP shortfall. We buy at R2.81/kWh or R2.86/kWh. We sell to South Africans at 66c/kWh.'*

Consumers do not know and cannot ascertain whether the electricity they pay for is from green energy or fossil fuels. They pay an ordinary normal fee. The shortfall puts in question the whole IPP setup. The respondent declares that if Eskom had authority with respect to the IPPS they would not go into contracts that subject them to loss of revenue. Eskom's mandate forces it into a compromising position of concluding these deals even if they defy business logic.

In the determination of whether Eskom should in fact be negotiating, there is a glaring conflict of interest given that Eskom is also producing and selling electricity. How can Eskom then objectively participate without compromising its own interests?

> '*The question for Eskom remains, what would compel Eskom to buy IPP RE ahead of its own electricity?'*

The respondent then suggests that an independent party should be mandated to negotiate these deals, reasoning that such agents would in all likelihood be objective and see into the negotiation and conclusion of sustainable PPAs between Eskom and IPPs.

Eskom would like other parties to add their input to the mandate, risks and issues for consideration given its position as a monopoly and owning 95% of the supply of electricity and the vast network infrastructure ownership. Eskom would still have a huge contribution to make but held to objectivity by the agent in the negotiation of sustainable agreements.

Concluding the findings on little or no say in the negotiation of PPA agreements was another stance that the matter of IPPs were out of Eskom's sphere of influence and in the domain of government.

> *'I would think Eskom's influence is quite limited. PPA's are imposed and Eskom who have no decision on the amount of energy and the ministry on how much will be in the bid and what will be allowed with little influence from Eskom. Eskom is forced to implement DoE Policy. Rather than influence Eskom may have little influence technically. The DoE negotiates and Eskom enter into PPAs. Eskom's role is quite limited*'.

4.2.1.4 The question of whether Eskom should have authority or influence

Through categories 1-3 on whether Eskom should have authority or influence in negotiations also drove differing opinions basically into camps. The one view was that Eskom should have the authority in these negotiations, given their position in the country and the fact that IPPs are driven by profits and this could prove problematic, given the desperate need for electricity in the country. IPPs would exploit the situation for their own gain regardless of the impact and burden on consumers.

In contrast, another view prevailed that raised alarm on Eskom being conflicted and if they were to participate, they would not do so objectively since Eskom was also a producer of electricity.

4.2.2 Issue 2: Risks and Critical Factors that in influence sustainable agreements between IPPs and Eskom

Issue 2 covers risks affecting the parties and then in some amount of detail covers critical factors found to have impact on sustainable PPAs. There are risks and issues facing both Eskom and IPPs that affect them separately as they come to the table. Some risks and issues affect both parties though.

Following this section, critical issues that have direct impact on the sustainability of PPAs are presented and listed

4.2.2.1 IPP concerns

4.2.2.1.1 Funding and Profitability

The findings revealed that the sourcing of funding for the project and financial sustainability is top most of issues that concern IPPs. To obtain finding, IPPs need to ensure they have a sound business plan and assurance of income to both construct and sustain the utility over its life.

> *'IPPs are concerned about the bankability of the project therefore in the PPA they must mitigate against what the government can and can't do;*

what Eskom can and can't do; Environmental problems; regulatory and political risk.'

Sourcing funding is difficult for IPPs and for most the funding model becomes their main constraint

'The political climate and economic conditions are not encouraging. There is currently a projection of 1% economic growth and the prospect of slipping into a recession. Where is the electricity demand going to come from?'

Much as the facilities might be built with whatever funding is obtained, the matter as argued by one of the respondents, is that an income stream might not be sustained should the South Africa not be able to have consumers for the electricity IPPs generate. An added risk, he added was resistance by the public to electricity hikes, an increase being the very reason that makes IPP's feasible. IPP Power can only be sold through the Eskom grid or directly to Eskom. This, by implication, had a direct impact on Eskom electricity which would never be affordable.

A large portion of core equipment used to build these facilities is imported. The exchange rate has impact on the cost of buying, construction and maintenance.

Further, the respondent added how he could not see RE technologies becoming more efficient and cheaper.

"Whether there is wind or not, the asset must be paid for. Solar can be saved by battery storage."

4.2.2.1.2 Profitability

The generation of constant revenue over the IPPs life, is but one of the concerns of the IPP. A related concern is profitability and sound escalation to mitigate increasing costs. These are linked to inflation in the form of the consumer price index (CPI).

'IPPs also face the investment risk of not making their return on investment. *The issue is when and whether they will be making profit?'*

4.2.2.1.3 The international wobble

A respondent highlights what he sees happening in the renewable environment globally that has impact on the South African REIPPP program affecting mainly foreign investors. He describes the phenomenon as a wobble in an otherwise prolific and successful sector. He cites particular examples,

'The two major RE companies SunEdison, the world's biggest RE developer, an American corporation that has global operations and some contracts is South Africa's renewable energy program. Another one is ABENGOA a Spanish renewable company that has a 250MW installation in SA. They are building renewable energy plants all over the world. Both these companies are in serious financial trouble.'

He declares both companies will in all likelihood declare bankruptcy in the next three months (by around April 2016). The problem, he points out, is their debts are too high and equity too low. Historically, this was apparently caused by the low interest rate in the USA. As an example, the companies have PPAs with Eskom in South Africa, the revenue generated funds debt in the parent company based in the US.

Unfortunately, the revenue streams they are generating from South Africa and other similar markets in developing economies are in local currencies. And these currencies' exchange rates are not stable against the US Dollar. This is far from the desired stable steady revenue streams required to sustain the parent company.

Whilst constant and stable revenue flows from the countries where investment has been made against the US Dollar, and decline in the rand, the generated revenue is neither steady nor constant. The current dollar strength leaves the parent company unable to service its own debt in the US borrowed in American

dollars. The problem is not unique to South Africa. The details are well covered in the respondent's article: *Wobbles in the sustainability of renewable energy* published on Moneyweb and EE Publishers in December 2015.

He believes this is merely a minor and temporary problem that will not thwart the surging growth of renewable energy and demand the world over.

The outcome of this view of Anbengoa SunEdison and similar foreign investor companies is articulated in the following:

> "*The wobbles SunEdison and Abengoa will sell their companies in SA. SA investors will get cheap deals in rand because they are not looking for yields in dollars but in rand and they will get a steady income from Eskom for the next 20 years."*

From a South African investor's point of view this is good, eliminating foreign buyers looking for earnings in foreign currencies. He then suggests there are enough buyers locally that are in a position to take over, citing that the Industrial Development Corporation (IDC), an industrial development bank based in South Africa, the Public Investment Corporation (PIC) and some local bankers already have significant stakes in these investments. He then points out that there is sufficient interest in the market for renewable energy investments as long as the income is steady over the next 20 years.

4.2.2.1.4 Production and/or Delivery

Another risk facing the IPPs is the extent to which IPPs will deliver the facility within agreed timeframes and meet required, contracted performance standards and self-imposed targets in line with their own business plans.

The extent of the risk is well described below:

> *'Renewable energy technologies have an embedded risk of not having 100% control of the availability of the natural resource for maximum electricity generation. If however, the facility fails to meet production targets, they risk bankruptcy'*

Another respondent also points out that the availability of the natural resource used in generating electricity is a pressing risk.

4.2.2.1.5 Eskom Meeting obligations

It was very clear to a respondent that IPPs face a cash-flow risk. The whole REIPPP program to them is an enterprising opportunity to them with little motivation other than making profit. A desire to make profit is not a bad thing.

> *'It is what good business people do. Their worry is cash-flow, being paid and paid on time.'*

IPPs need to manage risks around the meeting of Eskom and the SA government, their obligations, as well as threats arising out of the regulation and political changes.

A respondent and Spanish citizen, reveals that Spain had the biggest RE rollout program in the world in 2007 which resulted in a lot of Spanish RE professionals and industries operating all over the world. This program came to a sudden halt in 2012. The full impact of the global recession was felt hardest by that country. The government proclaimed that it was not in a position to honour any of the 25 year agreements with RE generators. Trust was destroyed completely and irreparably with investors and the Spanish government.

Mitigation of this risk in South Africa if Eskom and the government, in turn meeting obligations is covered by the following response:

> *IPPs worry about being paid therefore they require protection and remedies in the PPAs. Government supports the program so there is provision for this risk in the programme, in mitigation of this perceived risk by IPPs. It is called the Government Support Framework Agreement (GSFA). Under this framework agreement, should at any stage of the life of the PPA's that Eskom is not in a position to pay IPPs, the government will pay and find means of recovering funds from Eskom.'*

This is a form of guarantee to IPPs that should Eskom fail or find itself in a position where it cannot meet its financial obligations as per PPA, the IPP can then lay the claim with Government who commit to settling the claim(s).

4.2.2.1.6 A rare opportunity

Another respondent presented what was a rare observation and opportunity for operators of RE facilities.

> *'Running a solar PV plant is very easy. The only cost is the cleaning and maintenance of the units. An automated cleaner can also be deployed. In a vast property, livestock farming (sheep) can happen in parallel to having the solar panels.'*

4.2.2.1.7 Availability of transmission infrastructure / Inability to dispatch available electricity

Respondents also highlighted that another IPP concern is that Eskom, as the system operator, might not be able to dispatch available electricity. The reasons presented ranged between technical reasons, capacity constraints, availability of infrastructure and alignment of maintenance.

Capacity constraints are closely related to availability of infrastructure. In the area where the IPP intends producing electricity and connecting to the grid, there may be insufficient capacity in that network for conveying additional electricity. This, in itself, implies there is no available network infrastructure to evacuate supplied electricity in the earmarked area. As one respondent put it:

> *'Both the IPP and Eskom need to manage the imbalance to avoid load-shedding and balance the supply and demand. 70% of the generating fleet in Eskom is old. IPPs are needed for additional capacity. Can the lines take the extra capacity though? It is pointless to build a facility when*

there is no capacity on Eskom's transmission lines to evacuate the power.'

The second highlighted situation was the instance where the IPP intends building the electricity generating facility in a very remote area where the existing Eskom network (or any network) is just too far away.

There are instances of poor execution on the part of the system operator to execute or make the infrastructure available as per agreed PPA SCOD. A respondent expressed mistrust of large energy utilities and their capability to thrive sustainably in the sector. In the case of the REIPPP program, all connections happen once Eskom's Distribution and Transmission divisions complete their part of building infrastructure. The respondent regrets that whilst the facility could be ready, Eskom would not be.

'Eskom is a large organisation with extensive bureaucracy. Misalignment between Eskom planning and implementation of this infrastructure and IPP plans. Perhaps the biggest challenge being that IPPs are not accommodated in Eskom's infrastructure roll-out plans. There needs to be co-ordination between the programs for faster rollout of IPPs.'

Lastly, there may be misalignment and poor co-ordination between the parties even when the infrastructure is available. The two typical scenarios that were found are capacity planning and maintenance schedule alignment. The problem of capacity planning is best articulated in this declaration:

'The problem is that Renewable energies are self dispatchable and are always producing electricity. Even if the system operator requests them otherwise, they keep producing. The complication is that, Eskom in winter gets into differentials of off-peak and on-peak demand periods. There tends to be too much capacity in the mornings. Renewable technologies cannot be curtailed from producing for as long as there is wind/sun, they will produce. There is nothing in the PPA that requires them to stop production at low demand.'

The maintenance risks to the IPPs is that Eskom systems could be down and therefore not be able to transmit electricity produced by IPPs. From time to time, there will be system failures from either Eskom or the IPP, planned outages by either side have to be aligned to minimise the impact on either business as a result of such system or facility downtime. However, the problem is far more complex when such infrastructure is old and ailing.

The magnitude of the required maintenance and enhancements on the system are also a risk, given the extensive residual life assessment of transmission infrastructure components also known as a life of plant plan (**LOPP**). This assessment determines the remaining useful life of components before they start being unreliable and/or at risk of catastrophic failure, the respondent elaborates. The problem of old equipment is most prevalent in sub-stations.

4.2.2.1.8 Technical Performance and Grid Code

The system operator needs to ensure that electrical connection by IPPs onto the grid does not compromise the system. The one way of doing this is ensuring all electrical utilities and produced electricity is Grid Code compliant. No power producer can be connected to the grid unless they are certified as grid compliant.

There has not been a shortage of complaints from RE IPPs that the Grid Code is very stringent for them and they see compliance as a risk, many going to the extent of claiming that the code is not geared for RE technologies and needs to be relaxed. Initially, the conversations with the first RE technologies to come on line and Eskom Grid Code custodians learned there were many clashes between their technologies and Eskom's code. Adapting the code was essential. One respondent expressing that:

> '*Parties were still finding and determining with requirements were critical and which ones were not essential and agreeing to them. Compliance was costly, and wherever waivers were available and granted, this was appreciated by IPPs.'*

The take away was that the code needed development for RE technologies, and lengthy as it is, the consultation process of developing the code needed to be wider to include RE organisations and structures.

The writer and custodian of the Eskom Grid Code, one of the respondents, weighed in and maintained:

> '*Eskom is responsible for the operation and maintenance of the network therefore minimum technical requirements are imposed on the IPP for the sustainability and security of supply in the form of the Grid Code. Eskom is so strict in application that if the power generating facility fails to meet specification it might get disconnected from the grid until they upgrade and comply at the cost of the developer. Eskom has even developed a renewable code given RE technology primary energy is not as reliable as fossil fuels and other technologies. It was late for the first release of the DoE's REIPPP, where contracts were concluded days before the Renewable Grid Code was approved.'*

He added that there was no justification for claiming the grid was inaccessible to RE technologies. Enforcing the Grid Code is not taken lightly by Eskom whose chief concern is ensuring security of integrity and quality of electricity on the Eskom Grid. This often leads to increased costs to non-compliant IPPs and delayed transmission of electricity. The delays are not good for Eskom, who from a planning point of view, need utilities to come on line as agreed to supply the necessary electricity. However as one respondent put it:

> '*The integrity of the grid cannot be circumvented to cover for the risk of delay'*

Non-compliant facilities also impact the coming on-line of some facilities as they add strain to the scarce grid compliance resources that certify utilities in a tight schedule for those that require assessment. This becomes a basis for dispute for waiting for certification and claims of losing revenue as a result.

4.2.2.1.9 Changes in law

Another respondent that had seen significant negative impact on the RE roll-out program in Spain pointed out that changes in law were a big risk for RE investors. Certain changes in law related to the industry and power generation in particular often had direct impact on costs. Costs had a direct consequence on pay-back period. Smaller developers are very sensitive to such changes.

4.2.2.2 Risks specific to Eskom

Much as there are risks affecting IPPs, Eskom faces some risks in the process and these affect the sustainability of negotiations and agreements.

4.2.2.2.1 Availability and reliability of supply

Much of the quality aspects of supply are covered in the section addressing the Grid Code and compliance above. Largely, Eskom is concerned about the quality of electricity supplied by IPPs, voltage, frequency, reliability of supply, etc. Eskom's mitigation is the Grid Code. The mechanisms built into the code allow Eskom to disconnect any supplier from the network if they fail to comply.

There is however also a risk of availability of electricity for suppliers as well as reliability or the constant supply of electricity from the RE IPPs. Not coming on-line as planned has a dire effect on the security of supply.

> *'A big risk to Eskom is IPP electricity coming on line as scheduled and in line with capacity planning.'*

As further asserted by another respondent,

> *'From the Eskom point of view, availability is an issue. Eskom could plan and invest in transmission infrastructure and then power is not available from the suppliers. What will be done?'*

There is inevitably a process of vetting and from that arises some assumption that all who are approved will provide reliable and stable electricity. There are no guarantees!

4.2.2.2.2. Financial risk

RE IPP rates are higher than rates at which Eskom sells electricity. Government has committed to settle the difference between what Eskom charges consumers and what Eskom pays IPPs. The risks faced by Eskom with respect to this government undertaking are two-fold:

> '*Once Eskom has a claim, the fact that Eskom can claim is not in dispute, however there might be differences between Eskom and the Regulator over the assessment or value of the claims. The chief risk for Eskom is that this undertaking by government might not last for the duration of the PPA's. There might be regulatory changes'*

Changes in government, leadership and boards of either government or the energy regulator could result in these changes, therein lies the risk to Eskom. Simply put, Eskom could be left hanging, compelled to pay exorbitant prices for electricity from RE IPPs, whilst the regulator, in whatever form it could exist in future, prohibits Eskom from recovering those costs from tariff hikes or reneges on the GSFA.

4.2.2.2.3 Access to the Eskom network

Eskom, as the procurer of the electricity, is at risk of not having adequate network infrastructure capacity to evacuate electricity provided by itself and IPPs. For Eskom to supply and procure all required electricity it needs sufficient network capacity to carry and evacuate all electricity provided. Eskom is at risk of not being able to connect and being able to receive all the IPP off-take, transmit and distribute it to customers. This is well articulated by a Respondent in the following:

'IPPs especially RE come on stream very quickly. However developing infrastructure and provision of the network for connection at the source is not always as quick'

4.2.2.2.4 The risk of long-term contracts

Eskom is required to conclude contracts for 20 years, largely adjustable in line with inflation. The issue is no one can see into the future and the risks it may hold. Substantial price drops in fuel (oil and coal) as is the case now, could cause even more problems for the parastatal. The consumer will be forced to pay for high costs of electricity as contracted with RE IPPs whilst fossil fuel generated electricity could be much cheaper. This view feeds a view that IPPs have the best deals, all risk is passed on to Eskom and the consumer.

***'**There is great risk into entering into 20 year contracts with IPPs and the economy fails and either no longer requires the extra capacity. This risk might reside with Eskom being required to pay for this unnecessary extra electricity!'*

4.2.2.2.5 Declining consumption of Eskom electricity

There is declining consumption of electricity, either as a result of economic slowdown or consumers using other alternatives. The very inadequate supply of electricity by Eskom in recent times that resulted in load shedding has initiated migration from the monopoly model by forcing many customers to seek alternative energy solutions. In addition, consumers have been encouraged to reduce consumption and this has resulted in lowering sales for Eskom. If Eskom is not broken up, declares a respondent,

'*Eskom might not be around by 2020. This could be due to one or a combination of these: financial difficulties, technical capability, or simply unaffordable.'*

Another respondent qualified this saying,

> *'If Eskom doesn't wake up it might find itself where wealthy domestic users have made other arrangements leaving Eskom with poor domestic consumers who have a very low consumption and high cost of servicing. All the cherry pickers will all move to other energy sources and Eskom will be left with declining sales and increasing costs, playing havoc with Eskom's current business model.'*

Much as there are shortages of electricity now, this could very well be a reality in the very near future.

4.2.2.3 Risks facing both IPPs and Eskom.

4.2.2.3.1 Force Majeure

There are risks facing both Eskom and IPPs with varying effect. There are obvious ones like forces majeure. By definition, a respondent commented, these are uncontrolled and unplanned and often no amount of mitigation is sufficient. Endurance of one or both parties can depend on how these are managed. Given Government's eager renewable energy program, the broad perception is established that largely this risk could be passed on to Eskom and ultimately the consumer.

4.2.2.3.2 Lack of honesty and transparency

There is also a risk of mistrust where there is dishonesty, lack of transparency and an adversarial approach to negotiations.

> *The risk for me is lack of openness and honesty of true costs from both sides. Unfortunately, most of the time when people go into negotiations they seem to want to compete against each other for the purposes of profit. In my case that is why I am adopting the Ubuntu system which is being good in what you do. Seeking a win-win situation with most talking about it but not doing it.*

Those with more information seem to ‘win’, robbing the other party. However what good does winning yield when the sustainability of the program will be at risk on a matter of national interest?

4.2.2.3.3 Labour unrest

With the industrial relations environment in South Africa and prevailing economic conditions, labour unrest is a given and unfortunately it can cause project delays. A respondent suggested co-operation between the parties as mitigation for this risk.

4.2.2.3.4 Location of IPPs

Disagreements often arise because the location selected by an IPP is far from existing transmission infrastructure. During implementation, this could spill over into disputes and penalties enforced by the parties against each other. Adding to this are members of the public that exploit opportunities once information has leaked about such locations. They then quickly buy land in order to resell at exorbitant prices or derive income from servitudes for Eskom infrastructure through the properties.

The location conflict can also be best articulated by the respondent:

> *‘One other issue is too much focus on the price of the tariff at the point of connection, closest to the facility producing electricity. Not all electricity bought is delivered; some of it is consumed through losses on the system. Someone has to carry the cost of transporting electricity to the point of distribution/supply.*

4.2.2.4 Factors that contribute to sustainability

There are critical factors worth consideration and need application and negotiation as they contribute to the sustainability of ensuing agreements between Eskom and IPPs; these were submitted as follows:

4.2.2.4.1 Cost and pricing of Electricity

The cost of electricity supplied by IPPs and sold to the public must be scrutinised. IPPs are mainly driven by the opportunity to make profit. The delivery of electricity, what IPPs can provide and the need for Eskom to meet national electricity constraints' capacity brings these parties together. The two parties (Eskom and the IPPs) need to reach each other and unite in order to deliver electricity.

There are two financial options that can be applied in paying IPPs.

> *'Option A: application of the model used in gas and coal energy environments in order to incentivise investment, guaranteed payments of Capex over the life of the plant.*
>
> *Option B: No guarantee of payment. The IPP gets payment for total energy produced in kWh.*
>
> *Some countries have gone the route of guaranteed income revenue stream for the IPPs. Eskom pays for electrical energy produced.'*

Levelised cost of electricity (LCE) is an important determinant. If this rate works out for all parties, then there will be a sustainable agreement. However, IPP costs or values at which they sell electricity are generally higher than Eskom's.

Buying expensive off-take from IPPs and selling cheap to consumers is unsustainable. This item is so critical that its price has been described as a deal-breaker for IPPs. MYPD applications seek to address these as Eskom applies for tariff increases.

‘*This however causes conflict, tariff increases cannot be too high because of affordability by the public. Eskom faces a risk of reducing tariffs costs to unsustainable levels as Eskom continues to subsidise renewable technology IPPs.’*

These may have been costly and all prices cannot be perpetually passed on to the consumer without consequence. There is something to be said for the positive contribution to the considerable Social improvement of communities close to RE IPP facilities.

And the downward trend of RE IPP costs have brought optimism that the initial investment will, in time, yield cost effective, reliable and stable electricity supply from RE facilities. Where RE load factors are improving and better than projected, this signals improvement in the reliability of RE electricity.

‘The above plus the time it takes to bring Solar PV and wind technologies on-line makes these technologies attractive alternatives. Concentrated Solar Power (CSP) remains expensive however Solar PV and Wind technologies have been a tremendous success in reducing prices.’

Another point raised was transparency and mutual benefit as a success factor between the parties.

‘*Both parts should be able to know each other’s costs and manage them independently, the requisite transparency for both to have for sustainable agreements. Should there be increases to tariffs, both sides must equally benefit.’*

Transparency would assist with curbing high cost prices as a result of inefficiencies. Whatever the parties agreed to and signed as rates were not to change except for adjustments according to tariff increases, suggesting the adjustment rate to be linked to tariff rates of increases and not inflation. Every increase in tariffs as approved by the regulator would then be passed on to both Eskom and the IPPs.

Operational acceptance is a critical milestone for all parties. Eskom receives electricity in accordance with capacity planning. Profits of the IPPs are directly affected by this milestone, they start generating revenue and being productive after this date. No effort should be spared and mitigation put in place to prevent unnecessary delay of this date.

The tariffs awarded to IPPs must also not be prohibitive to the extent that the IPPs can barely run the facilities and unable to innovate and modify the facility to prevent the technology from being obsolete within the term of the agreement.

4.2.2.4.2 Negotiations and Equal treatment of all

A respondent recommended that there could only be equal treatment of all IPPs if there was to be a standard agreement for all. The point is made as follows:

> 'All players must know the rules and the application of the rules must be consistently applied, that would level the playing field.'

Another point made by a respondent was that compromise was not good for a sustainable agreement.

> '*A negotiated settlement is not the best outcome. Before the agreement, a negotiated settlement is not the best outcome. It is usually a settlement of compromises where neither party is really satisfied with the outcome.'*

Another respondent pointed out that critical success factors included purpose and focus on the deliverables and these were applicable beyond contracting. Where during contracting,

> '*The intent of the agreement is very important. It is critical that there is critical alignment in the intended outcome between the parties. Good principles of contracts management are also a good ingredient for sustainable agreements where both parties have full understanding of their respective roles and obligations and strive to meet them.'*

It is essential for parties to be united on the goal and understand their respective rights and obligations. Investment in competent contract

management resources by both parties is vital. They are capable of implementing and enforcing rights, obligations and general provisions of contracts with efficiency and implementing and enforcing these in line with good contract management principles towards the sustainability of the agreement and achievement of the goal of producing electricity for South Africa.

> '*Eskom benefits fully when power is brought on stream, however, it must ensure all obligations are met and that there is a disciplined and efficient contract execution. This alone has a very important bearing on the sustainability of the agreements during construction and the operational life of the IPPs.'*

This would allow parties to seek solutions even when they encounter difficulties post contract period. If however the contract is inflexible on particular issues, then the parties would be stuck and forced to resolve using whatever available mechanism, even if that means a dispute.

4.2.2.4.3 Pay-back Period

Pay-back period is an essential point to be negotiated and agreed. This point is best articulated by this amongst other respondents.

> '*For IPPs to reach payback period, they need at least 20 years' contracts otherwise they risk running into a loss. Clearly there is a requirement for long-term contracts in order to sustain the program.'*

Whilst price is a concern, equally, the term of the contracts is essential to the survival and sustainability of the agreements. As one respondent put it, a fundamental critical success factor for sustainable agreements is a:

> *'Sovereign guarantee on tariff for 20 years'*

4.2.2.4.3 Reliable, available and good quality electricity

Another key issue submitted by respondents was the reliable, available and good quality electricity, with the key concern being the impact of IPP generated electricity on the Eskom network.

> '*The total energy supplied is measured for reliability, delivery, quantity and efficiency of production. In addition, Eskom is responsible for the operation and maintenance of the network, therefore Grid Code compliance is not negotiable.'*

A critical success factor was Eskom holding IPPs to a high standard of electricity supply in maintaining the network for the good of all. The performance of IPPs in this regards becomes crucial.

> *'The performance of the IPP will be determined by the reliability, availability of electricity they supply and maintenance of their plant.'*

A good PPA addresses prices, risk and quality of supply. This also includes the operation and maintenance of the facility to the highest standards. Whilst capacity is important, reliability of supply lessens the risk of compromising capacity planning by the system operator.

Included in the PPAs must be confidence that IPPs will meet production requirements. However, should the IPP fail to meet the required production throughput, there should be remedies in the PPA for a lower tariff.

4.2.2.4.4 Payments and penalties

Payments were raised by respondents as a key success factor. This was in reference to IPPs being paid for electricity they produce. The question was raised then about unnecessary excess electricity produced off-peak. Should Eskom be made to pay, he asked.

Another aspect was penalties. As the respondent put it,

> '*Penalties for lack of availability of supply could also ruin an IPP! Would there be room in the contract for arrangements for IPPs to avoid*

penalties? For example, if the plant is rated at 250MW and it has a breakdown and cannot deliver. Would the IPP then be allowed to source the necessary capacity elsewhere to meet its own obligations?'

The question of peak and off-peak supply could be answered by a submission by another respondent who advised that pricing would have to consider the operating regime and the design.

'*The supply and demand management and requirements informs the design of facilities that makes them belong to one of the following operating regimes: Load following, peaking and base-load. The type of operating regime must be agreed upfront before the design and construction of a facility. This also informs the pricing of produced electricity.'*

He explained that Base-load electricity would be stable, consistent supply provided, that did not fluctuate throughout. Peaking supply is electricity supplied when excess electricity is required than was planned for and is available. Load following is that electricity provided that varies throughout the day according to required capacity.

4.2.2.4.5 Availability of transmission lines

The availability of transmission lines was described as an enabler of the REIPPP. These are network transmission lines that have adequate capacity and are ready and free to take on and evacuate supplied electricity by power producers.

4.2.2.4.6 Local Sourcing

Equipment, raw materials, inputs and expertise for such ventures usually came with multinational investors and imported from international markets, outside of South Africa. Respondents asserted that there were clear spin-offs if all or most of these resources were sourced from domestic suppliers wherever possible.

The section in risk above covering the international wobble dealt substantively with risks associated with sourcing of funding from offshore sources. Another respondent emphasised,

> **'***IPPs use money borrowed mainly offshore, from developed countries. Our currency weakness can lead to impossibility to honour the IPP's obligations in the currency they borrowed in.'*

The source of funding is clearly a critical factor as it is affected by foreign exchange. It is essential that this risk is mitigated by hedging to decrease the impact of foreign exchange effects on the developer of the generating facility. Alternatively sourcing funding locally will eliminate risk altogether.

4.2.2.4.7 Green Energy

Global warming and climate change have become global priorities. With this comes with new protocols to comply to and carbon taxes that are likely to be imposed by enlightened governments throughout the world. This was a critical success factor for negotiators to recognise the sustainability need for RE technologies for electricity provision into the future.

4.2.2.4.8 Management and allocation of risk

Risk has to be adequately allocated between the parties. There is an entrenched view that with the first installation of the REIPPP, the roll out was very generous, virtually no risk to IPPs.

> '*There was no risk on the IPPs. And there was sovereign backing for the PPAs for whatever agreed price. At the second round, there was no opportunity for negotiation!'*

The second and subsequent rounds increasingly transferred risk to IPPs. This could result in the latest contracts not being sustainable as room for negotiation is less and less.

There were also findings that there was also concern about Eskom going into long-term agreements. Circumstances change.

'If things change and coal and oil get cheap Eskom will be paying a very high price for electricity for primary energy at a much lower price. As you enter into a long PPA there needs to be a balancing of risk between Eskom and the customers on one hand and the suppliers on the other. It appears one sided as all risk seems to be against Eskom and customers. It seems the IPPs have good deals.'

Attention needs to be paid to the execution phase of the projects where most risk resides and requires mutual management for successful implementation.

'*For IPPs, missing critical milestones and ultimately the deadline for operational acceptance and commissioning, could result in penalties that in combination with lost income for commissioning late (loss of revenue) also reduce profits.'*

4.2.2.4.9 Conclusion: Critical success Factors for sustainable Off-take agreements

Findings in this part of the research revealed that the following were pivotal in lasting PPA agreements between Eskom and RE IPPs:

- **Cost and pricing of electricity** – Also defined as the deal-breaker for IPPs. Affordability remains crucial in the sustainability of agreed prices
- **Negotiations and equal treatment** of all addresses negotiations themselves, as well as consistency and the need to level the playing field by treating all bidding IPPs the same
- **Pay-back period** - findings spoke to the sufficient duration required by IPPs to be feasible and the risk faced by parties as a result of unpredictability of the future, given the dynamic nature of the world
- **Reliable, available and good quality electricity**. So long as IPPs were producing electricity within boundaries specified by the Grid Code, there would be no risk to the security of supply or revenue generated by the IPP for all off-take sold to Eskom.

- **Payments and penalties** – the findings addresses the rights and obligations of the parties. IPPs have an obligation to supply off-take which Eskom has an obligation to transmit and, in turn, has an obligation to pay for. Similarly, there exist punitive measures for any party that does not perform or meet obligations. The remedy of penalties is well placed in these agreements in **order to enforce agreed conditions in PPAs.**
- **Availability of transmission lines** remains a vital enabler of PPAs and the REIPPP in particular
- **Local sourcing is a South African imperative that has benefits for the local industry.** At the same time, off-shore funding has perils that seem to be remedied by local finance because of weak local currency that cannot sustain funding loans in strong foreign currencies like the US dollar.
- **Green** Energy is the globally popular choice for the sustainability of the planet. It is essential that parties think beyond themselves and temporary gain when the sustainability of the planet could be at stake and renewables offer energy without irreversible cost to the planet.

> *'**Management and allocation of risk** needs to be sufficiently managed and balanced to ensure sustainability of PPAs.'*

4.3 Results pertaining to the Proposition

The proposition for this research is: The vertical integration and monopoly of Eskom is unsustainable in the long-term, renewable energy from alternate suppliers will be the disruptive innovation to the extent of breaking the monopoly of Eskom.

From the findings made, it is clear that there is no one solution to the model of electricity supply in South Africa. The responses seem to look forward and across the world for what is happening there and factors in all dynamics in this environment.

South Africa does not operate from a position of ignorance on available alternatives and options with respect to various models for the electricity supply and distribution in South Africa. As was pointed out by a respondent,

> '*My view is fairly clear on this. The structure on the policy document produced in 1998 was a very farsighted policy document. It is the official policy document of government. The liberal approach was too far sighted for the political reality constrained by the tripartite.'*

The production of a policy document of an advanced model that included private participation in the generation of electricity then is indicative that there was clarity on the part of government that there were options other than monopoly by a state owned entity to the provision of electricity.

Findings also reflected several views on what would be the best or optimal model or even a mix of models for electricity generation: the first view sympathised with maintaining the status quo; the second pushed for an open market in line with international trends.

4.3.1 View 1: Eskom's monopoly is good for South Africa

The respondents that perpetuated the view that the current monopoly had to be maintained were chiefly concerned about the Social needs of the country, and access to electricity by the majority of poor consumers.

As one respondent put it:

> '*Let us go to the constitution. Electricity in SA is a right, as much as water, and so on. Being a right, it is critical for the state to have control. If they do not have control, they will be in trouble. You cannot allow the private sector to be the driver of a particular right. The private sector are not in the business of rights. The State cannot de-alienate that responsibility'*

The private sector chooses prices in order to get profit and sustain their businesses. Rights are not a priority. A case of medication is cited by the respondent where the state was concerned about people living with HIV and AIDS, who also had a right to be taken care of by the government. The fact that many South Africans were living with the disease without treatment and many died was not sufficient motivation for pharmaceuticals to sell medication at cheap prices or make medication accessible to those who could not afford it.

Likewise, access to electricity by the poor is unlikely to impel private companies to risk their businesses by running at a loss to see to it that the South African public has access to cheap and affordable electricity.

This view entrenches the belief that the state must have control of the provision of electricity, whilst maintaining the vertical integration monopoly of generation, transmission and distribution or sale of electricity.

This view however does not infringe on the rights of private entities that seek to participate in generating electricity. It also does not censure those who seek to generate for themselves or to source their electricity from whatever source from doing so.

If companies were to use the Eskom network for wheeling electricity to their clients there must be due compensation considering system losses, as electrical power gets depleted on the system. Equally, those that seek to sell their electricity to Eskom, should have no issues doing so.

> '*The sustainability of supply is a government responsibility. My personal view, (is that) in a developing country the model of vertical integration works. The supply of electricity from the state owned utility is the best.'*

There is no shortage of evidence, the respondents contended. Before government decided to open up the industry, preventing Eskom from building power stations to allow private enterprises to do so, Eskom never battled to meet electricity demand and always had a sound balance sheet.

The mishap occurred when private companies realised that no financial model could compete against Eskom and remain profitable, electricity in South Africa was the cheapest in the world then. It was only after being permitted to build power stations too late that problems started, resulting in load shedding.

> *'In Spain the electrical industry is sectionalised into businesses that generate, distribute and commercialise (sell) electricity. It is however very expensive that way. With vertical integration of Eskom, everyone can have electricity. When the provision of electricity is privatised, not everyone can afford it. This would be disastrous for people living in townships most of whom would in all likelihood not afford privatised electricity.'*

If there are areas in Spain that connect illegally in order to steal private and expensive electricity, this situation would be worse in South Africa. As it is with relatively cheap electricity in South Africa, illegal connections are rampant in poor communities and informal settlements. Government here, like private companies in Spain, largely turn a blind eye to stolen electricity through illegal connections, avoiding bad publicity.

4.3.2 The second view: The open market approach

The second opinion differs from the first in that it advocates an open market approach where Eskom is part of a number of competing electricity generating utilities. It supports diversity of utilities, generating technologies and more competition open to international investors.

> *'South Africa has done it one way for too long, a method that came with the old regime. We need a fresh vision that will include International stakeholders and investors, the government and black emerging groups. The monolithic structure is holding South Africa back. According to the 1998 White Paper, transmission must be independent granting equal access to all for all electricity suppliers to the grid and not skewed to the incumbent.'*

The view of more competition does not stop with generation of electricity; it also encourages restructuring of distribution

> *'I believe we should restructure the distribution. There are too many municipalities to offer wholesale pricing. There must a separation into wholesale, wires and retail to develop the energy market. What they've done in the UK. All of this is exactly what the white paper describes."*

All of this is government policy that is not being implemented by the government that suggests that government might not be in support of its own policy. The expected effect of restructuring and the inclusion of more players on the market will make Eskom more relevant and sustainable, where the current monopoly of the entire electricity supply chain is seen as inhibiting raising of capital in South Africa.

Capital could also be obtained if some existing divisions of Eskom, including Generation, could be unbundled. If anything, the weak capitalisation by Eskom is indicative of the inability of the current model to attract sufficient funding.

Some respondents in support of opening the market to competition seemed aligned in their intent to keep some parts of Eskom intact, more specifically, Transmission. They were not in support of unbundling Transmission, instead advocating for a monopoly in that particular part of the business.

Another interesting aspect was the diversification of the energy mix, best articulated by this response,

> '*And if Eskom doesn't wake up might find itself where wealthy domestic users make other arrangements leaving Eskom with poor domestic consumers who have a very low consumption and high cost of servicing. All the cherry pickers will all move to other energy sources and Eskom will be left with declining sales and increasing costs, playing havoc with Eskom's current business model.'*

The view projects a future of energy supply where those that can afford it will go off the Eskom grid and generate their electricity that they could potentially sell to Eskom when they have access. The model of centralised generation and mega power generating like Medupi could be at risk of obsolescence as more flexible and agile customer focused business models reign.

With the economy slowing, power stations generating 4800MW each can price themselves outside of the market. Especially with RE technologies slowly approaching the pricing of fossil generated coal with the added advantage of coming on line swiftly.

This view was not lost on Eskom senior management as proven by Eskom's own Research and development manager presented this view at an Energy conference organised by the DoE in Cape Town in 2015.

Another respondent added that,

> *'I would probably see Transmission as the power purchasing body and all PPAs sitting with Transmission. Transmission is best suited to do so because they can control the purchase of electricity. Where there was a question of whether IPPs could compete with Eskom's paid for power*

generating assets, the answer is that Eskom is a big monolith with debt and ailing plant.'

Eskom is now and into the future going to compete with many small companies with newer facilities and technologies.

A strong assertion supporting the opening of the market was supplied by a respondent that said,

'Break-up Eskom into the Network and Generation. Customers should have the right to choose the electricity supplier.'

Another suggested the competitive structure was for an independent system operator that would be an independent body. The operator would receive bids of electricity supply from suppliers. The operator would then procure the most cost effective electricity depending on demand.

The independent system operator view was supported by another respondent who said,

'The best model for me would be that of an Independent system and market operator (ISMO). It would have an independent Transmission system operator, independent distributors, Eskom could just generate. Whilst the old model worked when it did, internationally, the ISMO model is in use.'

With this model, what electricity consumers pay, would be dictated by the market which because of competition amongst all electricity producers would be cheaper for consumers. The system operator would be getting the cheapest price that would be passed on to consumers.

Consumers would also be afforded an opportunity to select the type of electricity on the market, RE, fossil fuel, etc. Today's consumer is very sophisticated. Hence the success of free range chicken and chicken eggs has a captive market of informed consumers that pay a premium. Likewise, electricity consumers would have access to choices where the prices of renewables, fossil fuel, etc. would be advertised by the system for sale.

In this model, all operation and maintenance of the system would be the responsibility of the system operator. That would also remedy the perception of unfairness when it comes to grid access. There have been complaints from IPPs that Eskom received preference having advantageous access to the grid and IPPs were left to battle for constrained balance capacity on the grid if at all.

In addition to impartial access to the grid, alignment of maintenance of the transmission grid would also be independent of Eskom influence, equalising access for all not aligning maintenance to one specific party.

With the current model, there is risk to the Eskom network and by implication supply of electricity. Money in Eskom is drawn away from investing and maintaining the Eskom grid and is more focused on big generation plant like Medupi and Kusile, the two 4,800MW facilities under construction by Eskom, as well as the touted 9600MW nuclear build touted by government.

A view was also heard from a respondent that suggested that breaking down the Eskom monopoly was in progress if the integrated resource plan is anything to go by.

> '*As I understand it, there's a framework. The Minister makes a determination on the MW to be sourced from which technology. The Integrated resource plan identifies the various forms of electricity generation from Gas, RE, Nuclear, etc.'*

The view also looked to the limiting of Eskom's role in generation, suggesting that Eskom be left to maintain and operate the system whilst IPPs are left with the responsibility of generating electricity. Eskom would remain with the role of transmitting and distributing electricity and the risk of generating would lie elsewhere.

In the findings, there was a view that differed with most that suggested that the energy utilisation in South Africa was peculiar in that all if not most energy was linked to electricity, failing to use other energy forms like gas. The respondent put it this way,

'*The diversification of energy sources is very important. For me it is very confusing that people use electricity for cooking and heating geysers and not using gas. It is within the means of both the people and the country why not revise adjust policy to deal with this. For example, gas is very efficient but produces Carbon dioxide (CO_2). Electricity is very inefficient but also produces about 4 times the amount of CO_2.'*

Careful consideration around just green technologies and the extent of green impact is questionable. Some of the countries producing components for green technologies have little or no regard for the environment, so there is no assurance that sufficient consideration would have been made for the environment in the manufacturing process. Disposal of such equipment at the end of life is likely to also have negative impact on the environment.

That said, South Africa has abundant wind and solar resources. Even farmers with dams can produce electricity. Diverse forms of energy and electricity improves the options rather than having all eggs in one box.

The cynical view on Eskom as a state entity and it's capability to deliver is fuelled by mistrust of large organisations in the field as well as mistrust of public administrators.

'*The disadvantage of public administration is the administrators. They often lack the skill and know-how to manage with efficacy and efficiency.'*

First, Eskom is a state owned entity, and state owned entities are not renowned for their efficient processes. They tend to be lethargic, slow to change. Second, big utilities are burdened with high costs, inefficiencies and are inflexible, making it difficult to compete in a highly competitive and dynamic environment. In developing countries where small to medium scale electricity producers are increasing, large enterprises are not adapting.

4.4 Summary of the results

The study comprises a research question and a proposition. Both have had varied responses. The Research Question divided in two sections, the one exploring Eskom's power going into negotiations and the other addressing the impact of critical issues and risks on the resulting PPA between Eskom and any IPP.

The Proposition addresses itself on the matter of a suitable electricity supply model in South Africa. The views were varied. However, the responses enabled the researcher to suggest relevant recommendations.

CHAPTER 5. DISCUSSION OF THE RESULTS

5.1 Introduction

The findings relative to the research question and the research proposition are discussed in this chapter. The findings regarding the research question addressed two issues. The first issue sought to address the extent of Eskom's authority and influence to impact PPAs between themselves and the IPPs and contribute meaningfully to their sustainability. The second issue within the research question responded to the risks and critical factors contributing towards the sustainability of agreements between Eskom and alternate electricity suppliers.

The research proposition findings spoke about the extent of the sustainability of Eskom's vertical integration and monopoly in the provision of electricity in South Africa. The proposition was supported by some who felt change was essential and inevitable, but other respondents felt the vertical integration and monopoly were good for South Africa

5.2 Research Question Issue 1: Eskom's authorisation to negotiate and conclude sustainable of PPAs

The collected data was divided into three responses. The first suggested Eskom had full authority, the second reduced Eskom's authority to influence and the third pointed out that Eskom had little or no say in the signed PPAs with IPPs. This section determines whether Eskom, in fact, has either authority, influence or none in the process of negotiating and concluding sustainable PPAs.

The first category of responses suggested that Eskom had authority to negotiate and conclude these agreements; such authority was sufficient to enable Eskom to have direct power on the sustainability of the resulting PPAs. The basis of these responses was those involved in wheeling agreements certainly felt the might of stringent Eskom technical requirements. The second

basis for the view was also based on the fact that access to the Eskom network was not automatic on compliance, there had to be available capacity on the network to convey the generated electricity.

None of the responses suggesting Eskom had full authority, referred to delegated authority or documented consent by Eskom's principals to negotiate. Technical compliance to the grid code is a non-negotiable prerequisite. None of the bidding parties that fail to demonstrate capability and intent to comply can be negotiated with. Simply put, they do not qualify to be put forward for negotiations. It cannot be said that Eskom has authority to negotiate to the extent that they can ensure signed contracts are sustainable on the basis of the motivations brought forward.

The second view proposed that the extent of Eskom's power in the negotiations and signed contracts was just influence in the process, documentation, negotiations and the final document. The reasons put forward were as shown in Table 4.

Table 4: Eskom has influence

Factor	Motivation/reason for influence
1. Negotiations and Eskom's experience	In negotiations, no party should dominate the outcome. Both parties should influence the outcome. Eskom has sufficient experience to negotiate and finalise contracts.
2. Eskom position weakened	Eskom is in a compromised position, given that it is incapable of meeting the demand. Desperation on the part of government is palpable to the IPPs
3. Eskom is an essential party	Both IPPs and the DoE need Eskom. Eskom cannot be excluded from negotiations and their views cannot be ignored being a critical stakeholder.
4. The REIPPP is led by the DoE	Eskom cannot be said to be in full authority, given that the process is led by the DoE, not Eskom.
5. Eskom is the off-taker, network and the balance sheet owner	Eskom's views are influential because of its position as an off-taker, operator and maintainer of the network, supplier and distributor of electricity
6. Technical influence	Eskom sets specifications required for compliance by the IPPs
7. Insufficient political clout	The extent of direct contact and sway of IPPs on some government officials is said to be one reason Eskom's role has been relegated to an influencer.
8. Lessons learned convince government to listen to Eskom.	In preceding bids, Eskom's ignored advice in the earlier roll out phases materialised, forcing the DoE to listen to Eskom

The third view suggests Eskom has neither authority nor influence in the negotiations and final PPAs that are signed. Six positions were put forward as reasons why Eskom had no influence:

- The government, through the DoE, leads the procurement process. Eskom is brought in to sign the PPA, accept agreed terms and buy the off-take in the agreement. The DoE negotiates and Eskom is expected to sign the contracts
- Whilst required to regulate the grid code, Eskom is seen as the provider of the network.
- Electricity and the tariffs that can be charged are regulated by Nersa
- Eskom's mandate is controlled by its sole shareholder, the government through the DPE, limiting Eskom to an implementer of government policy.
- Eskom would not conclude these PPA's because the pricing on its own is not in line with sound business practice of making profit, instead of buying high and selling low.
- There is a glaring conflict of interest where Eskom as a producer of cheap electricity would be required to conclude sustainable agreements with its competition, suggesting an agent managing the process would be the best approach.

It is clear from the above that the arguments for and against Eskom having influence to the negotiations and subsequent contracts are compelling. In the literature review details from the Public-Private Infrastructure Advisory Facility (2014) reflect how the DoE owns up to the process of planning and awarding of contracts with IPPs. This is in alignment witht the view that the department leads the process and Eskom is a participant.

Further, Nersa's regulatory rules for power purchase cost recovery (Nersa, 2009) asserts how PPAs can occur betweeen utilities and IPPs and emphases that Eskom is required to purchase power from IPPs as part of government's implementation of the integrated energy plan. The same regulations allow for the imposition of PPAs on Eskom.

One cannot agree with the position that Eskom has absolutely no influence. However, it is easier to accept, given the above evidence that Eskom does in fact influence the outcomes, although the role is quite limited.

5.3 Discussion pertaining to the Research Question

Findings on risks and key issues affecting sustainable PPAs is summarised in Table 5.

Table 5: Risks and key issues affecting PPAs

<table>
<tr><th>Risks Affecting IPPs</th><th>Risks Facing Eskom</th></tr>
<tr><td rowspan="2">Funding and Profitability
The international Renewable Energy Projects wobble
Production and delivery concerns
Uncertainty that Eskom and government will meet obligations
Availability of transmission infrastructure
Meeting the Grid Code specification
Changes in law
A rare opportunity</td><td>Availability and reliability of supply
Financial risk
Providing access to the Eskom network
The risk of long-term contracts
Declining consumption of Eskom electricity</td></tr>
<tr><td>Risks affecting both Parties
Force Majeure
Labour unrest during construction
Complications of location</td></tr>
<tr><th colspan="2">Critical factors that contribute to sustainability</th></tr>
<tr><td colspan="2">Availability of transmission infrastructure and capacity remains a vital enabler of PPAs and the REIPPP in particular
Local sourcing is a South African imperative that has benefits for the local industry. At the same time, off-shore funding has perils that seem to be remedied by local finance that does not sustain funding loans in strong foreign currencies.
Green Energy is the globally popular choice for the sustainability of the planet. Parties should think beyond themselves and temporary gain when the sustainability of the planet could be at stake
The Management and allocation of risk needs to be sufficiently managed and balanced to ensure sustainability of PPAs.</td></tr>
</table>

None of the findings are misplaced. For example, Shaikh et al (2014) identified several risks including the regulatory environment, the presence of infrastructure as well as tariffs as obstacles to international investment in the power generation industry in South Africa. They cite the example of unavailability of infrastructure enabling the off-taker to receive and transmit electricity as a major barrier.

Financial risk is also extensively discussed in the literature review. A study of Nersa's (2009) Regulatory rules for power purchase cost recovery addresses cost recovery concerns and returns the responsibility of the sustainability of Eskom back to the Regulator.

The REIPPP program (Public-Private Infrastructure Advisory Facility, 2014) puts the spotlight on community development and localisation of procurement content, construction, maintenance and operation. It also highlights the decisive government targets of distribution of electricity to IPPS and RE targets by 2030.

These require sufficient reflecting and application from the parties as well as ensuring that these are negotiated and provided for in the contract.

5.4 Analysis of the Research Question Concluded

The question of whether Eskom has influence in the negotiation and signing of contracts was resolved in that Eskom does have influence, much as it is significant, it is quite limited though. There is clearly an area where Eskom has authority and takes the lead, technical specifications. There were views that Eskom is conflicted so limited influence is appropriate. However, Eskom's input cannot be outright ignored and it is not.

None of the risks and issues contributing to the sustainability of resultant PPAs must be ignored. Provision for any eventuality will be a key determinant of the strength and subsequent sustainability of the PPAs.

5.5 Discussion pertaining to the Proposition

The research proposition explores the sustainability of the current electricity supply model in the country where Eskom has a monopoly and is vertically integrated, generating, transmitting and distributing electricity. Findings on some models are explored. However, before the findings of the interviews are made and discussed in the context of literature review material, it is important that the government's integrated resource plan around electricity provision is understood.

The South African resource plan 2030

The literature study significantly revealed the government's resource plan and it is decisive on the prominence of renewable technologies in the past, now and in the future. Table 6 displays the facts and figures on resource planning with data obtained from the Public-Private Infrastructure Advisory Council (2014).

Table 6: Electrical Power Plan capacity figures

Electrical Power Plan 2010 to 20130	
	MW
Committed build (2012)	**1 515**
Percentage of the total capacity planned (2010-2012)	**3%**
2012 - 3030	
New Build (planned for post 2012 to 2030)	**17 800**
Percentage of total SA capacity planned	**39%**
Import Hydro	**2 609**
Percentage of the total capacity planned	**6%**
Total RE capacity 2010-2030	**21 924**
Percentage of the total capacity planned	**48%**
Total Planned new capacity between 2010 and 2030	**45 637**

According to this plan, Government intends that, of the 45 637 MW of electricity installed in 2030 from all power utilities, 48% should from renewable technologies. Of that figure, 39% has yet to be issued for construction for generation by RE IPPs in South Africa. These are reflective of the intentions of Government to focus on renewables into the future. The total capacity to be brought on line between 2010 and 2030 is 109% of the 42 GW currently produced by Eskom (Eskom, 2014).

5.6 Discussion of findings

The results accumulated for the research proposition indicated that there are many options for sustainable solutions. Government was found to be forward looking in terms of policy. As early as 1998, Government was already suggesting differentiation of the market (Department of Minerals and Energy, 1998).

The first view was that the current monopoly and vertical integration of the parastatal is good for South Africa. Respondents supported this by pointing out the contrast in business objectives of IPPs versus Eskom.

Eskom is the vehicle through which the government meets its Social and constitutional mandate of provision of electricity for all. IPPs cannot be expected to drive constitutional mandates, they are driven by profit. For a developing country like South Africa, respondents contest that the current model is the only appropriate model.

Examples of the poor in countries where electricity provided by IPPs cannot be afforded by the poor are cited. The poor have resorted to stealing electricity. If the South African poor already cannot afford electricity provided by the parastatal, it is clear that if IPPs dominate, not all will be able to afford electricity in South Africa.

On the opposite end of the scale was a view of an open market that eliminates the monopoly and vertical integration of Eskom. First the view seeks to limit the role of Eskom to that of a system operator, evacuating electricity supply from

producers, transmitting that using its vast network and supplying customers. In addition Eskom would also operate and maintain the network.

There is also the possibility of transition where those that can afford it have elected to go off the grid by producing their own electricity and selling off excess back to Eskom. There is increasing risk that Eskom and its power provision model of large fossil fuel and nuclear facilities will become unaffordable and obsolete, replaced by agile smaller IPPs generating RE.

A proposition of an ISMO model is proposed where all producers can bid for their electricity and sell that to consumers who will have increased options and competitive rates determined by the market. Consumers in this model have more options and can select electricity generated for the particular technology they want, regardless of cost. An interesting view also questioned the use of electricity for uses that other types of energy sources could be used, such as gas for cooking.

South Africa has vast renewable resources in the sun and wind and access to gas. It is not impractical to migrate to these forms of energy utilisation, whether people like Eskom or not.

Amongst other things, the DPE (2015) confirms its own weaknesses, confirming to a large extent the belief by sceptics about how public enterprises lack relevant skills. However, it was worth noting how indifferent the respondents were to whom, in particular, Eskom accounted to in government.

The mandate of Eskom is outlined as provision of “sustainable electricity solutions to assist the economy to grow and to improve the quality of people in South Africa and in the region” (Eskom, 2014, p.23). This appears to support the view that Eskom is the deliverer of political and constitutional responsibilities of government, binding Eskom to prioritise people and country ahead of profit. Eskom is thus suited in its current monopoly and vertical integration model to meet the needs of the people in South Africa.

Eskom (2014)’s annual report also suggests that Eskom cannot be seen to be in conflict when getting involved in deals with private enterprises that are seen

to be its competitors in the energy generation space. The reason for this is that one of the strategic pillars of Eskom recognises the importance of private sector participation and partnership in the electricity industry. Further, the strategic pillar intimates the significance of the evolution of electricity supply in the industry, this being a position of the government as articulated in its White Paper on Energy Policy of the Republic of South Africa (Department of Minerals and Energy, 1998) wherein the unbundling of Eskom is declared.

Huang et al (2011) pushes a revolutionary electricity model not far from the findings made in this research of the energy internet where households, industries and electricity utilities will be interconnected in a future electricity model. This is not far-fetched and once again, Favaro (2014) and McGrath (2013) assert in their notions of internet of things and transient advantage respectively, that Eskom is unlikely to exist in its current format in the future.

5.7 Research Proposition Conclusion

There is certainly sufficient evidence that there is no one solution for a sustainable model for electricity supply in the country. It also cannot be proven at this stage that Eskom will definitely be obsolete as RE IPPs disrupt the electricity space in this country. One thing is certain though that change in the electricity model of South Africa is inevitable. Eskom might not maintain the grasp it currently enjoys in either the monopoly or vertical integration. However this picture is not going to change overnight.

The determinant of the shape and form in which Eskom exists will, in future, be the extent to which the government applies its own policy as set out in its own white paper (Department of Minerals and Energy, 1998) and how the parastatal adapts to change.

CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS

6.1 Introduction

Conclusions and Recommendations take us through the findings made in the literature review, listing the Research question and the proposition made, disclosing the essence of findings and drawing conclusions. Some recommendations are then made to the stakeholders as well as some suggestions for further research on matters that arose in this study but could not be covered by this report.

The literature review of this study yielded a research question and research proposition. The research question had three aspects that required to be studied. The first one was the authority that Eskom had over the negotiations to the extent of giving rise to sustainable agreements between themselves and alternate suppliers of electricity. Second, the first question also sought to determine risks and crucial factors to the negotiation and finalisation of PPA between Eskom and IPPs.

The research proposition suggested that the vertical integration of Eskom and its monopoly were unsustainable and would in all likelihood be relegated by RE IPPs who would disrupt and dominate the electricity industry in South Africa.

6.2 Conclusions of the study

6.2.1 *Concluding on the Research Question: Eskom's Authority, Risks and critical factors contributing to sustainable PPAs*

Findings in this report indicate that in spite of some sentiment that Eskom had absolute power or none with respect to negotiating sustainable agreements,

Eskom has influence. Eskom gave input to the process and was afforded some input by the DoE on the negotiated agreements.

Risks and critical factors contributing to sustainable agreements were identified and these were in line with existing literature. The nature of the risks was such that some affected IPPs, some affected Eskom and lastly, there were risks that affected both parties equally. These cannot be ignored by the parties when they plan and negotiate.

Sufficient remedies and mitigations are required to treat the likelihood and impact any would have on the desired outcome of sustainable agreements. Likewise, attention needed to be paid to critical factors contributing to sustainable agreements. The responses of the parties and other critical stakeholders individually and collectively will be a yardstick on the extent of the sustainability of resultant PPAs.

6.2.2 *Conclusion on the Research Proposition*

Findings from the research survey are read in the context of government's resource plan 2030. The resource plan highlights the extent of the determination of government to go the route of renewables. Out of the intended delivery of 45GW of electricity in 2030, 48% is from renewable technologies with 38% to be sourced and generated within South Africa (Public-Private Infrastructure Advisory Council, 2014). As at March 2014, over 85% Eskom electricity was generated through coal with the only renewable source (Hydro) contributing 1.4% of the 42GW capacity. Such a bold plan to move much of that away from fossil fuels is transformation of the electricity industry (Eskom, 2014).

Much as some old and ailing, mostly coal, facilities will be decommissioned (Public-Private Infrastructure Advisory Council, 2014), fossil fuel and nuclear generated electricity does remain as part of that planned energy mix. Collectively they will contribute 48%, 22GW between 2012 and 2030, a far cry from 85% generated from coal now.

The above, as well as policy spelled out in the Department of Minerals and Energy 1998 yellow paper, confirms government's determination and forward looking approach. The tough balance becomes, first the determination of whether the current electricity supply model is suitable for South Africa. Second, it needs to be investigated whether another approach is more suitable.

One thing is clear about privatisation of electricity; IPPs will not be on a mission that is not financially beneficial. That mission for instance could be electrifying all poor homes in formal and/or informal settlements. Should most of the electricity be privatised and prices decided by the markets, those servicing the poor will lose out and be bankrupt. Eskom's mandate on the other hand is to deliver electricity with the intent of growing industry and improving the quality of life of South Africans and neighbouring countries. The poor are covered in the current form of the industry.

The proposed sustainable models of the future varied from:

- Appointment of an all generators of electricity bidding to sell their electricity in an open market though the ISMO. Allowing consumers to buy their electricity from known sources at competitive prices
- Eskom taking on the role of system operator, operating and maintaining the network, buying and selling electricity. Potentially unbundling of some of Eskom's assets to raise capital and include private investors in that market. Transferring most of the electricity generation to others.
- Revolutionary concepts, like the energy internet, were put forward as a future scenario. This is where all households and industries can also generate renewable electricity independently and sell spare capacity back to Eskom or the system operator.

The findings reflect that there are certainly several approaches to electricity provision. More research would have to be made to determine which option would be most optimal bearing in mind the Socio-political needs of South Africa whilst also meeting economic objectives. The model would have to provide solutions to the above. In the South African space, the plans for renewables are

a clear priority if they are to be 38% of new total energy plans for this country by 2030.

One can only guess whether renewables from IPPs will in fact be so disruptive as to turn the industry around because no such evidence was found. It is determined, though, that RE from IPPs will be key players in the South African energy market and sector. The findings on the research proposition are inconclusive.

6.3 Recommendations

Readers need to take note of a few things about Eskom, and the findings of this study:

Eskom is a key and capable electricity provider

There is sufficient evidence to suggest so. Much as there was a period in which there was load shedding, it could not possibly be Eskom's fault. Eskom is under the control of government. Government at the time prevented Eskom from building power stations with a view of diversifying the market. Unbeknownst to all, electricity provision from Eskom was in fact very cheap and could not profitably sustain any private investor.

The security of the electricity network is capably and closely controlled by Eskom through the Grid code. To this end, Eskom has been a good custodian of that infrastructure

Equally, Eskom remains one of the most effective tools of delivering services and constitutional rights to South Africa. The delivery of electricity to all, including those who cannot afford it, is an enormous Social responsibility by government to the people.

Plans for delivering electricity

When the shareholder and other relevant government departments make any decision on energy in this country, they need to consult with Eskom. It is also recommended that Eskom participate on an equal footing with the DoE regarding the negotiating and issuing of PPAs. Eskom can never be held accountable for unsustainable PPAs between themselves and IPPs if they are not empowered to influence the process negotiate and sign the contracts. Eskom has to be more than just a buyer of off-take; it must have more influence and control.

It is a very complex matter to achieve these REIPPP contracts which requires much application by all parties concerned. There are risks, opportunities and

critical factors to ensure that consequent agreements are sound and, most importantly, are sustainable.

Renewable electricity generating technologies continue to develop the world over and getting more competitive in pricing compared to other technologies. With more investment and harnessing the technologies, they will in all likelihood be more reliable, efficient and cost less than fossil powered technologies. Given the global effort to move to green technologies, the cost of generating electricity from fossil fuels will be much more expensive. The main contributors will be carbon credits or tax as well as the capital investment required to comply with increasingly stringent emission regulations.

The Electricity supply model will inevitably change

Eskom will not perpetually hold on to the monopoly and vertical integration it holds. This is not necessarily a bad thing, government's own policy document support a free market in the energy electricity generation. It is better for Eskom to be proactive than react to a disruption that has already occurred. Aspects that will, in all likelihood be affected are: The vertical integration.

Eskom might survive if they focus on an area of absolute capability and expertise. Most opinions suggested that Eskom, because it owns, operates and manages the network and electricity provision, should consider the chief role to be that of the system owner

The second aspect that could change is Eskom's monopoly. Should there be a disruption that costs less and achieves much more than the current set-up efficiently, Eskom might just relinquish its position of dominance. The shape and form of the new Eskom might only be determined by the agility of response to such change when it occurs.

If the currency weaknesses of developing nations are anything to go by, local investors investing in RE technologies will be more profitable than off-shore funding. Servicing debt in a foreign developed country using revenue generated from a nation with weakening currency poses a risk that such loans may never be honoured, bankrupting an otherwise profitable utility.

The days of electricity use for everything are nearing their end. There needs to be an energy optimisation plan at the highest level. Cooking for instance is quickest and most efficient using gas. The infrastructure for gas delivery and utilisation should be planned and implemented.

6.4 Suggestions for further research

During this study, it became clear there were areas that could not be covered by this report. The first suggested above is an appropriate and/or optimal electricity supply model. The research would confirm future policy on electricity provision for South Africa.

I. One of the issues would be whether the monopoly by the SOE is the best alternative.
II. Secondly, further research could also seek answers whether it is best for Eskom to remain the system owner or whether that role should be performed by another independent body.
III. Importing Cross-border electricity. With renewables, hydro and solar, some of South Africa's neighbours appear to have more abundance than South Africa. The study should investigate this imminent possibility.
IV. Exploration of the feasibility of the energy internet in South Africa.
V. Inclusion of alternate energy sources as an integrated resource plan that would include, wind, solar, gas, battery, hydro, and so on. South Africa uses electricity for things where other nations use different technologies or energy sources.

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APPENDIX A: The interview Questionnaire

Research Project Interview: (NAME of RESPONDENT)

Designation:

Organisation:

Date:

Time:

Venue:

[KN Notes]

- Declare Interview and Purpose
- Request to **record** interview only for the purposes of transcribing
- Confidentiality of information and source, disclose only to the university for credibility
    - **Confidentiality can be guaranteed**
    - **Anonymity can be guaranteed**
- Will share transcription for verification and confirmation
- Will share the report on request

The Interview

The Topic of the Research: **Negotiating sustainable off-take agreements between Eskom and alternate electricity suppliers <u>in South Africa</u>**

*(The focus of the report is on Renewable Energy alternate suppliers of **Solar (CSP, Photovoltaic), Wind and battery storage**, and to a lesser extent, Hydro, Biomass and Biogas electricity. **In South Africa**.)*

1. In your understanding, what is the extent of Eskom's authority and influence on the extent of the sustainability of the off-take agreements?

The fact that the Energy regulator (NERSA) regulates electricity pricing, the Department of Public Enterprises (DPE) is the shareholder of the SOE, do these have impact your response above?

2. What in your view is a sustainable electricity supply model in so far as it concerns the current vertical integration of Eskom (Generation, Transmission and Distribution) as well as the monopoly? What impact would the current model and your proposed one impact Sustainable off-take contracts with Alternate suppliers?

3. What in your view are risks/issues affecting alternate suppliers and Eskom separately. Re there areas of key conflict?

4. What key success factors or elements of a sustainable energy off-take contract between Eskom and Alternate electricity suppliers that must be negotiated by these parties? Which of these are the most critical in your view?

5. **If any, what is you view on**:
    - Renewable Energy technologies (Solar, wind, battery storage?)
    - Government Policy
    - Cost of electricity in SA
    - Any part of Legislation
    - Industry regulation:
        - Localisation
        - FDI incentive
    - Funding
    - The Market for electricity
    - Inflation and foreign exchange
    - Negotiations themselves

    and their bearing (Risk and/or opportunity) on negotiating sustainable off-take agreements between the parties?